

Prüfbericht-Nr.: Test report no.:	JP23VU3C 001	Auftrags-Nr.: Order no.:	168457367	Seite 1 von 24 Page 1 of 24
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2024-01-05	
Auftraggeber: Client:	Faurecia Clarion Electronics Co., Ltd. 7-2 Shintoshin, Chuo-ku, Saitama-shi, Saitama 330-0081 Japan			
Prüfgegenstand: Test item:	Car Audio			
Bezeichnung / Typ-Nr.: Identification / Type no.:	P2301			
Auftrags-Inhalt: Order content:	Test Report			
Prüfgrundlage: Test specification:	CFR47 FCC Part 15: Subpart C Section 15.247 RSS-247 Issue 3 August 2023 RSS-Gen Issue 5 February 2021			
Wareneingangsdatum: Date of sample receipt:	2024-01-10	Please refer to Photo Document		
Prüfmuster-Nr.: Test sample no:	A003635657-001~002			
Prüfzeitraum: Testing period:	2024-01-10 - 2024-02-29			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:			genehmigt von: authorized by:	
Datum: Date:	2024-03-06	Signed by: Jonathan Li	Ausstellungsdatum: Issue date:	2024-03-06 Signed by: Bell Hu
Stellung / Position:	Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert
Sonstiges / Other:	FCC ID: AX2P2301 IC: 419C-P2301, HVIN: P2301 This report is for Bluetooth function.			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
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Anmerkungen
Remarks

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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. <i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i>

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 99% BANDWIDTH

RESULT: Pass

5.1.4 20dB BANDWIDTH

RESULT: Pass

5.1.5 CARRIER FREQUENCY SEPARATION

RESULT: Pass

5.1.6 NUMBER OF HOPPING FREQUENCY

RESULT: Pass

5.1.7 TIME OF OCCUPANCY

RESULT: Pass

5.1.8 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHz BANDWIDTH

RESULT: Pass

5.1.9 RADIATED SPURIOUS EMISSION

RESULT: Pass

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1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of Bluetooth BR & EDR

Appendix B: Photographs of the Test Set-up

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China.

FCC Accreditation Designation No.: 694916

ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing (SRD-Tonscend)					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. until
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY60241175	2023-09-22	2024-09-21
MXG X-Series RF Vector Signal Generator	Keysight	N5182B	MY61250137	2023-09-22	2024-09-21
EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY61250141	2023-09-22	2024-09-21
DC power supply	Keysight	E3642A	MY61276100	2023-09-22	2024-09-21
Power Control Unit	Tonscend	JS0806-4ADC	N/A	2023-09-22	2024-09-21
Automation Control Unit	Tonscend	JS0806-2	21C8060396	2023-09-22	2024-09-21
Test Software	Tonscend	JS1120-3	N/A	N/A	N/A
Control PC	Lenovo	TianYi510S-071MB	YLX23JMF	N/A	N/A
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2021-06-22	2024-06-22
Unwanted Emission Testing (TS9975)					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. until
EMI Test Receiver	R&S	ESR 7	102021	2023-07-26	2024-07-25
Signal Analyzer	R&S	FSV 40	101439	2023-07-26	2024-07-25
System Controller Interface	R&S	SCI-100	S10010038	N/A	N/A
Filterbank	R&S	Wlan	100759	2023-07-26	2024-07-25
OSP	R&S	OSP 120	102040	N/A	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2023-07-26	2024-07-25
Amplifier	R&S	SCU-18F	180070	2023-07-26	2024-07-25
Amplifier	R&S	SCU40A	100475	2023-07-26	2024-07-25
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-07	2024-08-06

Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-07	2024-08-06
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-28	2024-08-27
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-08-07	2024-08-06
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-06-22	2024-06-22

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Table 2: Measurement Uncertainty

Parameter	Uncertainty (k=2)
RF output power, conducted	± 0.99 dB
Occupied Channel Bandwidth	± 2.08 %
RF power density, conducted	± 0.99 dB
Unwanted Emissions, conducted	± 0.89 dB
All emissions, radiated	±4.17 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

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2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The product is a Car Audio, which supports Bluetooth(BDR/EDR)and 2.4GHz/5GHz Wi-Fi wireless technologies.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	Car Audio
Type Designation:	P2301
FCC ID:	AX2P2301
IC:	419C-P2301
PMN:	Car Audio
HVIN:	P2301
Operating Voltage:	DC 14V
Technical Specification of Bluetooth (dual mode)	
Operating Frequency:	2402 MHz to 2480 MHz
Type of Modulation:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Channel Number:	BR & EDR mode:79 channels
Channel Separation:	BR & EDR mode:1MHz
Data Rate:	BR & EDR mode:(1Mbps, 2Mbps, 3Mbps)
Antenna Type:	Integral antenna
Antenna Gain:	-0.4dBi (Provided by the Client)

Table 4: RF Channel and Frequency of Bluetooth BR & EDR

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402.00	20	2422.00	40	2442.00	60	2462.00
1	2403.00	21	2423.00	41	2443.00	61	2463.00
2	2404.00	22	2424.00	42	2444.00	62	2464.00
3	2405.00	23	2425.00	43	2445.00	63	2465.00
4	2406.00	24	2426.00	44	2446.00	64	2466.00
5	2407.00	25	2427.00	45	2447.00	65	2467.00
6	2408.00	26	2428.00	46	2448.00	66	2468.00
7	2409.00	27	2429.00	47	2449.00	67	2469.00
8	2410.00	28	2430.00	48	2450.00	68	2470.00
9	2411.00	29	2431.00	49	2451.00	69	2471.00
10	2412.00	30	2432.00	50	2452.00	70	2472.00

11	2413.00	31	2433.00	51	2453.00	71	2473.00
12	2414.00	32	2434.00	52	2454.00	72	2474.00
13	2415.00	33	2435.00	53	2455.00	73	2475.00
14	2416.00	34	2436.00	54	2456.00	74	2476.00
15	2417.00	35	2437.00	55	2457.00	75	2477.00
16	2418.00	36	2438.00	56	2458.00	76	2478.00
17	2419.00	37	2439.00	57	2459.00	77	2479.00
18	2420.00	38	2440.00	58	2460.00	78	2480.00
19	2421.00	39	2441.00	59	2461.00		

Test frequencies are lowest channel: 2402 MHz, middle channel: 2441 MHz and highest channel: 2480 MHz for Bluetooth BR & EDR

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Bluetooth transmitting mode (BR & EDR mode)

- 1) Low Channel
- 2) Middle Channel
- 3) High Channel

B. On, Transmitting on Hopping channel

C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- ID Label and Location Info
- User Manual
- Operation Description

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model P2301 in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Laptop	Lenovo	T480	PF-16A6N8
Portable Laptop	Lenovo	ThinkPad T480	10Q67059

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

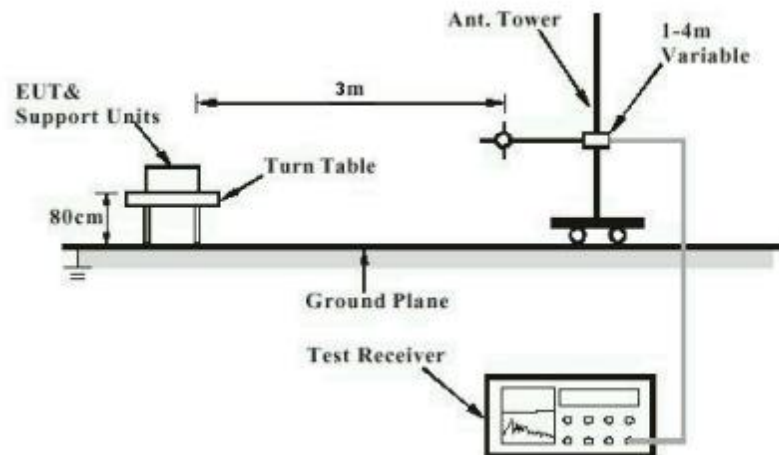


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

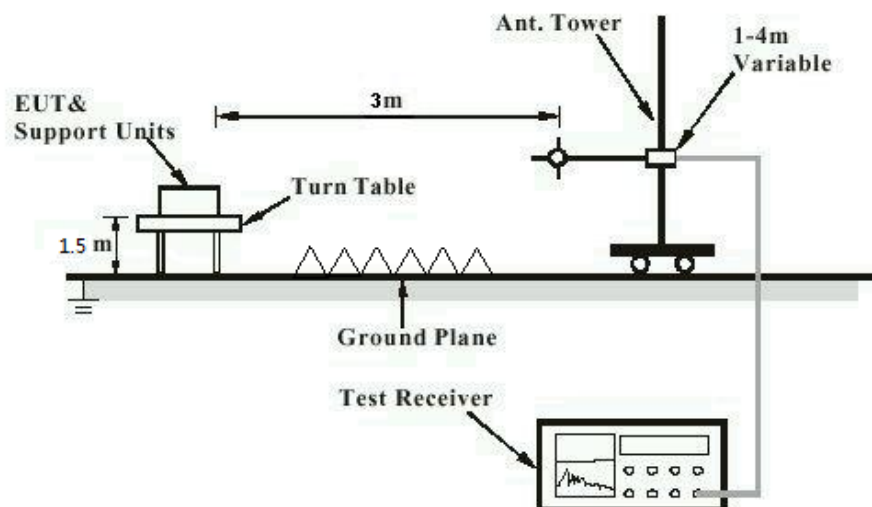
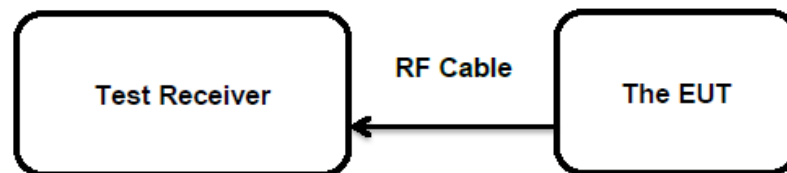


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(b)(4) and Part 15.203
RSS-Gen Clause 6.8

The EUT has an Integral Antenna, the directional gain of antenna is -0.4 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

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5.1.2 Maximum Peak Conducted Output Power

RESULT:

Pass

Test Specification

Test standard	: FCC Part 15.247(b)(1)&(3) RSS-247 Clause 5.4(b)&(d)
Basic standard	: ANSI C63.10: 2013
Limits	: FHSS < 0.125 Watts, DSSS < 1.0 Watts
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2024-01-10 - 2024-02-29
Input voltage	: DC 14V
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 22.4 °C
Relative humidity	: 38 %
Atmospheric pressure	: 101 kPa

For details refer to following test result.

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Table 6: Test Result of Maximum Peak Conducted Output Power, Bluetooth BR & EDR

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
GFSK (BR)	2402.0	0.13	0.0010	< 0.125
	2441.0	0.37	0.0011	
	2480.0	-0.05	0.0010	
Maximum Measured Value		0.37	0.0011	
Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
8DPSK (EDR)	2402.0	1.99	0.0016	< 0.125
	2441.0	2.01	0.0016	
	2480.0	1.93	0.0016	
Maximum Measured Value		2.01	0.0016	
Max. e.i.r.p=2.01dBm-0.4dBi=1.71dBm, which is less than 36dBm=4W.				

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): -0.4dBi

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5.1.3 99% Bandwidth

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(a)
RSS-Gen Clause 6.7
Basic standard : ANSI C63.10: 2013
Kind of test site : Shielded Room

Test Setup

Date of testing : 2024-01-10 - 2024-02-29
Input voltage : DC 14V
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 22.4 °C
Relative humidity : 38 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A.

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5.1.4 20dB Bandwidth

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(a)(1)
RSS-247 Clause 5.1(a)
Basic standard : ANSI C63.10: 2013
Kind of test site : Shielded Room

Test Setup

Date of testing : 2024-01-10 - 2024-02-29
Input voltage : DC 14V
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 22.4 °C
Relative humidity : 38 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A.

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5.1.5 Carrier Frequency Separation

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(a)(1) RSS-247 Clause 5.1(b)
Basic standard	: ANSI C63.10: 2013
Limits	: $\geq 25\text{kHz}$ or $2/3$ of 20dB bandwidth, whichever is greater
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2024-01-10 - 2024-02-29
Input voltage	: DC 14V
Operation mode	: B
Test channel	: Low / Middle / High
Ambient temperature	: $22.4\text{ }^{\circ}\text{C}$
Relative humidity	: 38 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

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5.1.6 Number of Hopping Frequency

RESULT:

Pass

Test Specification

Test standard : FCC part 15.247(a)(1)(iii)
RSS-247 Clause 5.1(d)
Basic standard : ANSI C63.10: 2013
Limits : ≥ 15 non-overlapping channels
Kind of test site : Shielded Room

Test Setup

Date of testing : 2024-01-10 - 2024-02-29
Input voltage : DC 14V
Operation mode : B
Ambient temperature : 22.4 °C
Relative humidity : 38 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A.

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5.1.7 Time of Occupancy

RESULT:

Pass

Test Specification

Test standard	: FCC part 15.247(a)(1)(iii) RSS-247 Clause 5.1(d)
Basic standard	: ANSI C63.10: 2013
Limits	: < 0.4s
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2024-01-10 - 2024-02-29
Input voltage	: DC 14V
Operation mode	: B
Test channel	: Low / Middle / High
Ambient temperature	: 22.4 °C
Relative humidity	: 38 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

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5.1.8 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	: ANSI C63.10: 2013
Limits	: 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2024-01-10 - 2024-02-29
Input voltage	: DC 14V
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 22.4 °C
Relative humidity	: 38 %
Atmospheric pressure	: 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix A

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5.1.9 Radiated Spurious Emission

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3
Basic standard	: ANSI C63.10: 2013
Limits	: Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Section 8.9 & 8.10
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 2024-01-10 - 2024-02-29
Input voltage	: DC 14V
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: Refer to test result
Relative humidity	: Refer to test result
Atmospheric pressure	: 101 kPa

Remark:

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix B.

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Appendix A: Test Results of Bluetooth BR & EDR

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Appendix A.1: Test Results of 99% Bandwidth

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.891	2401.529	2402.420	---	---
		2441	0.999	2440.478	2441.477	---	---
		2480	1.008	2479.481	2480.489	---	---
3DH5	Ant1	2402	1.353	2401.304	2402.657	---	---
		2441	1.314	2440.322	2441.636	---	---
		2480	1.308	2479.322	2480.630	---	---

DH5_Ant1_2402



DH5_Ant1_2441



DH5_Ant1_2480





Appendix A.2: Occupied Channel Bandwidth

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.88215	2401.5461	2402.4283	---	---
		2441	0.88885	2440.5457	2441.4346	---	---
		2480	0.87589	2479.5541	2480.4300	---	---
3DH5	Ant1	2402	1.2155	2401.3680	2402.5835	---	---
		2441	1.2108	2440.3731	2441.5839	---	---
		2480	1.2052	2479.3823	2480.5875	---	---

DH5_Ant1_2402



DH5_Ant1_2441



DH5_Ant1_2480



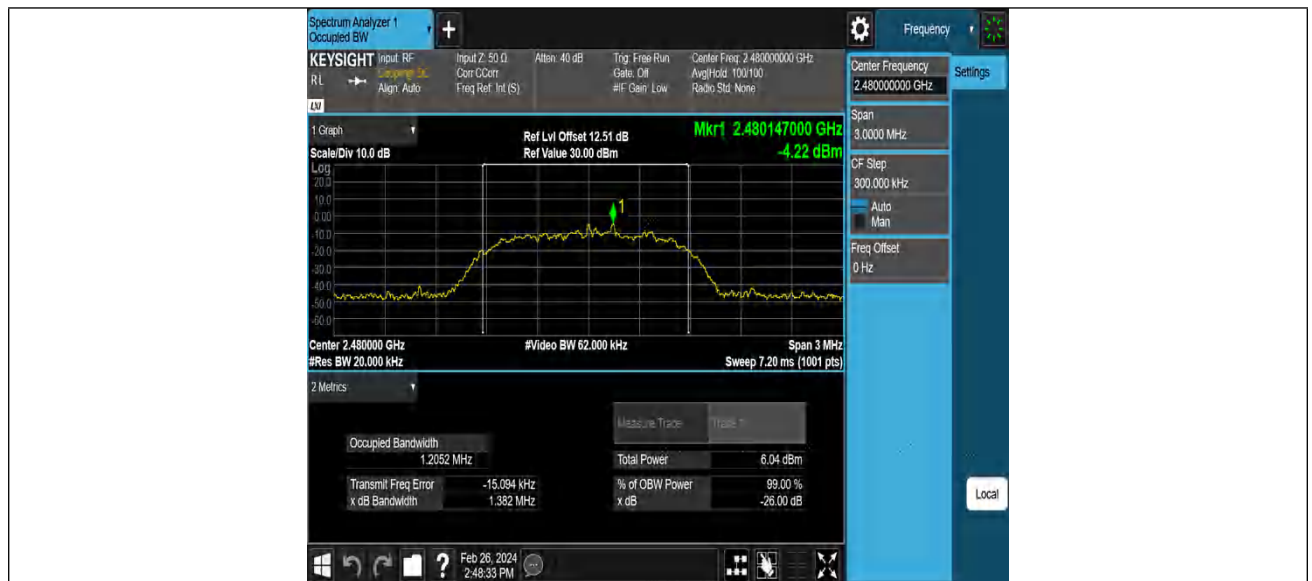
3DH5 Ant1_2402



3DH5 Ant1_2441



3DH5 Ant1_2480



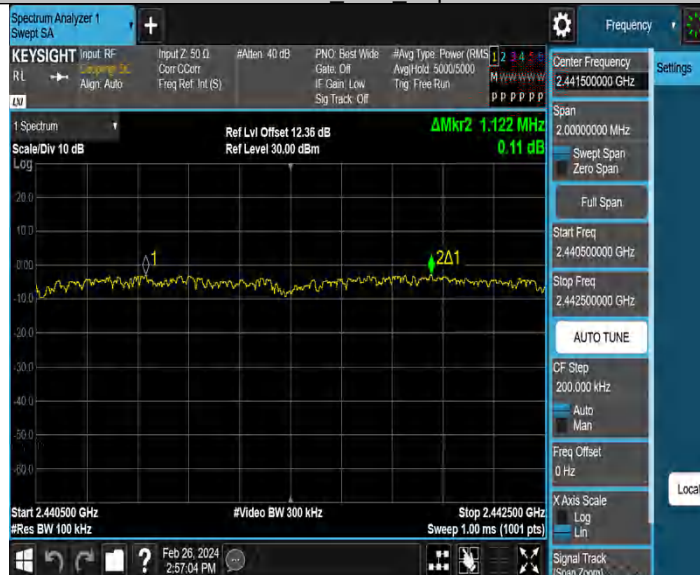
Appendix A.3: Carrier frequency separation

TestMode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	0.968	≥0.672	PASS
3DH5	Ant1	Hop	1.122	≥0.902	PASS

DH5_Ant1_Hop



3DH5_Ant1_Hop



Appendix A.4: Time of occupancy

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.381	316	0.12	≤0.4	PASS
DH3	Ant1	Hop	1.638	165	0.27	≤0.4	PASS
DH5	Ant1	Hop	2.885	109	0.314	≤0.4	PASS
3DH1	Ant1	Hop	0.388	318	0.123	≤0.4	PASS
3DH3	Ant1	Hop	1.639	156	0.256	≤0.4	PASS
3DH5	Ant1	Hop	2.889	102	0.295	≤0.4	PASS

DH1 Ant1 Hop



DH3 Ant1 Hop





3DH1_Ant1_Hop



3DH3_Ant1_Hop





Appendix A.5: Number of hopping channels

TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

DH5_Ant1_Hop



3DH5_Ant1_Hop



Appendix A.6: Band edge measurements

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	-0.2271	-50.32	≤-20.23	PASS
		High	2480	-0.6118	-49.74	≤-20.61	PASS
3DH5	Ant1	Low	2402	-2.067	-49.45	≤-22.07	PASS
		High	2480	-1.347	-48.53	≤-21.35	PASS
DH5	Ant1	Hopping	2402	-0.6559	-49.31	≤-20.66	PASS
		Hopping	2480	-2.115	-49.81	≤-22.12	PASS
3DH5	Ant1	Hopping	2402	-2.427	-49.59	≤-22.43	PASS
		Hopping	2480	-3.66	-51.26	≤-23.66	PASS

DH5_Ant1_Low_2402



DH5_Ant1_High_2480



3DH5_Ant1_Low_2402



3DH5 Ant1_High_2480



DH5_Ant1_Hopping_2402



DH5_Ant1_Hopping_2480



3DH5_Ant1_Hopping_2402



3DH5_Ant1_Hopping_2480



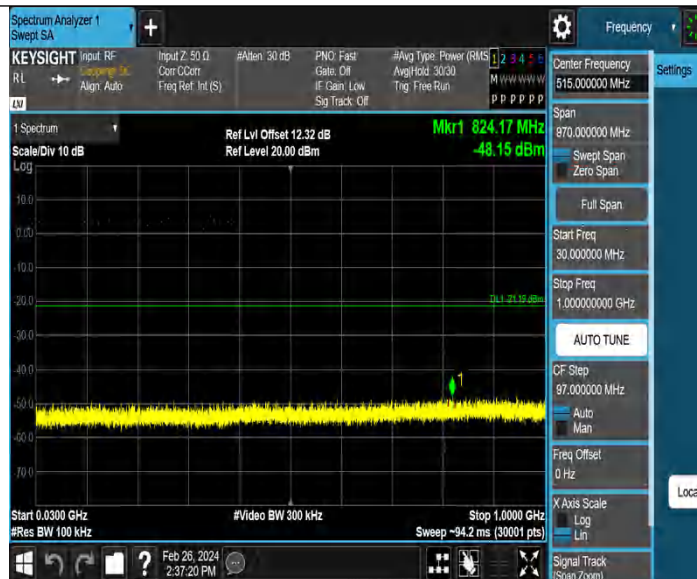
Appendix A.7: Conducted Spurious Emission

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	-1.19	-1.19	---	PASS
			30~1000	-1.19	-48.15	≤-21.19	PASS
			1000~26500	-1.19	-38.21	≤-21.19	PASS
		2441	Reference	-0.76	-0.76	---	PASS
			30~1000	-0.76	-47.51	≤-20.76	PASS
			1000~26500	-0.76	-38.71	≤-20.76	PASS
		2480	Reference	-1.15	-1.15	---	PASS
			30~1000	-1.15	-47.26	≤-21.15	PASS
			1000~26500	-1.15	-38.48	≤-21.15	PASS
3DH5	Ant1	2402	Reference	-3.51	-3.51	---	PASS
			30~1000	-3.51	-47.49	≤-23.51	PASS
			1000~26500	-3.51	-38.37	≤-23.51	PASS
		2441	Reference	-1.99	-1.99	---	PASS
			30~1000	-1.99	-47.8	≤-21.99	PASS
			1000~26500	-1.99	-38.55	≤-21.99	PASS
		2480	Reference	-1.75	-1.75	---	PASS
			30~1000	-1.75	-47.38	≤-21.75	PASS
			1000~26500	-1.75	-37.02	≤-21.75	PASS

DH5_Ant1_2402_0~Reference



DH5_Ant1_2402_30~1000



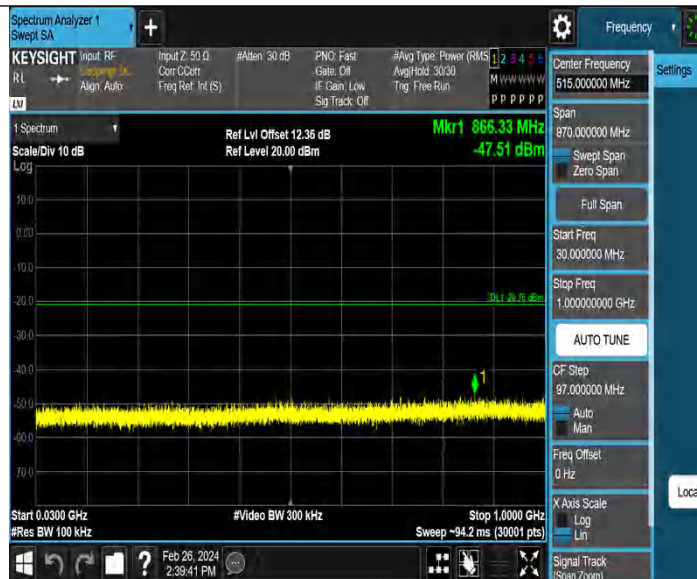
DH5 Ant1 2402 1000~26500



DH5 Ant1 2441 0~Reference



DH5 Ant1 2441 30~1000



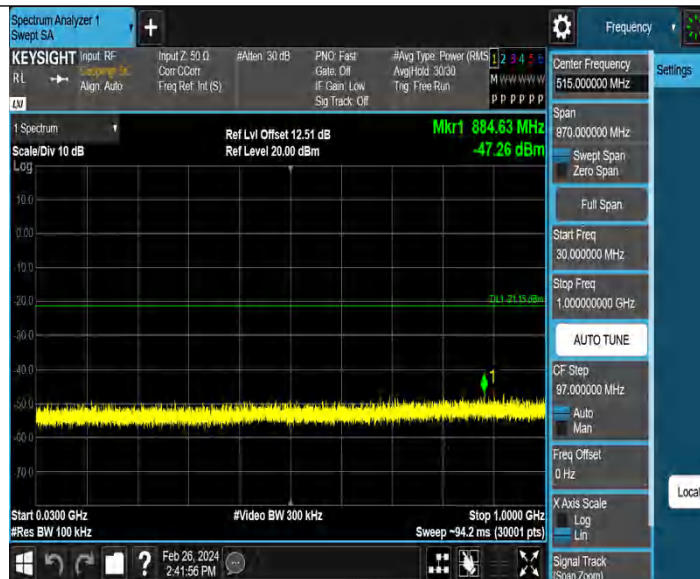
DH5 Ant1 2441 1000~26500



DH5 Ant1 2480 0~Reference



DH5 Ant1 2480 30~1000



DH5 Ant1 2480 1000~26500



3DH5 Ant1 2402 0~Reference



3DH5 Ant1 2402 30~1000



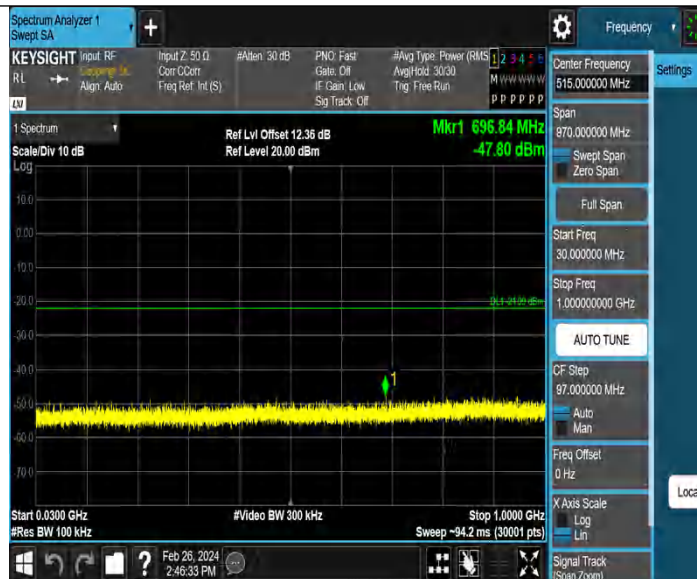
3DH5_Ant1_2402_1000~26500



3DH5_Ant1_2441_0~Reference



3DH5_Ant1_2441_30~1000



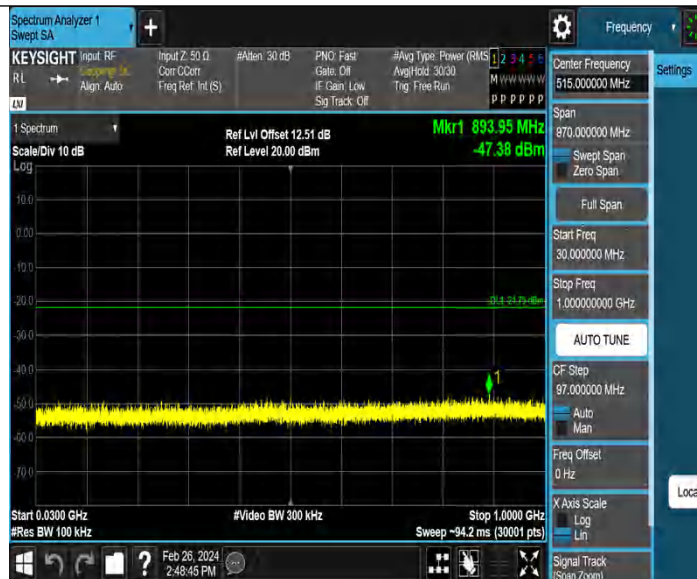
3DH5_Ant1_2441_1000~26500



3DH5_Ant1_2480_0~Reference



3DH5_Ant1_2480_30~1000



3DH5 Ant1 2480 1000~26500



Appendix A.8: Test Results of Radiated Spurious Emissions

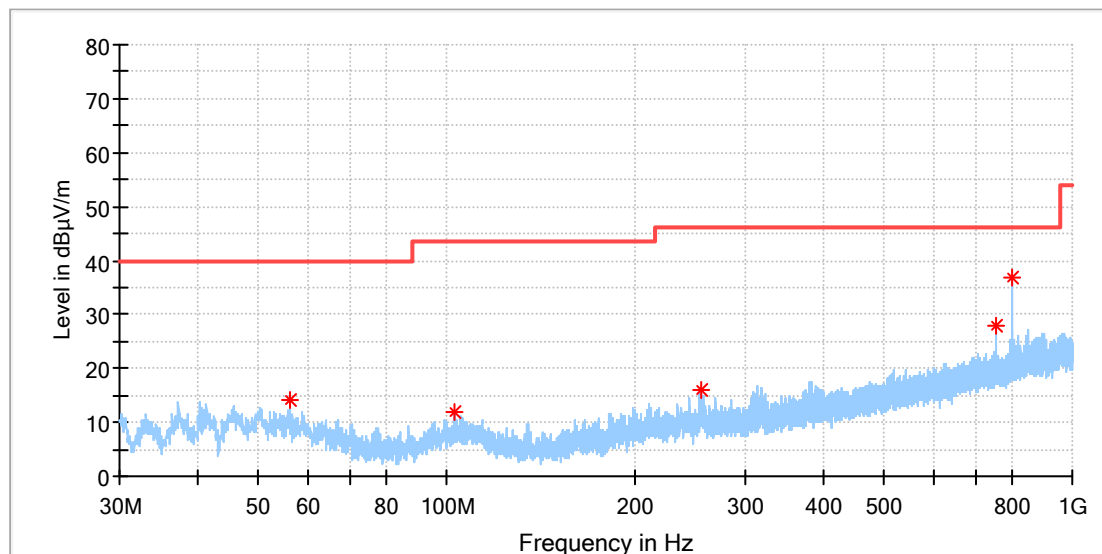
Note:

- 1) This testing was carried out on different modulations, but only the worst case was presented in this report.
- 2) Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz - 26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

30 MHz - 1GHz

EUT Information

EUT Name:	Car Audio
Model:	P2301
Test Mode:	BR_DH5_Mid channel
Order No./Sample No:	168457367/A003635657-002
Test Voltage::	DC 14V From DC Source
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
56.227308	14.17	40.00	25.83	100.0	H	27.0	-18.9
103.123077	11.91	43.50	31.59	100.0	H	187.0	-19.2
255.114615	16.16	46.00	29.84	100.0	H	329.0	-17.6
754.291539	27.98	46.00	18.02	100.0	H	36.0	-7.5
800.030769	36.81	46.00	9.19	100.0	H	59.0	-6.8

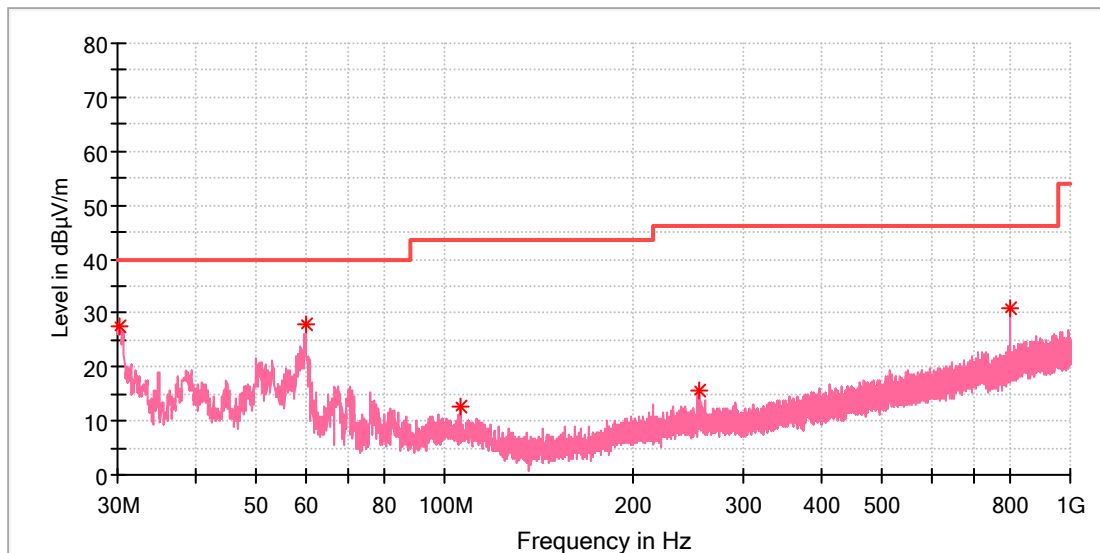
Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name:	Car Audio
Model:	P2301
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	168457367/A003635657-002
Test Voltage::	DC 14V From DC Source
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.223846	27.39	40.00	12.61	100.0	V	198.0	-23.3
60.070000	27.78	40.00	12.22	100.0	V	233.0	-19.3
106.256923	12.73	43.50	30.77	100.0	V	21.0	-19.2
254.965385	15.77	46.00	30.23	100.0	V	0.0	-17.6
800.030769	30.84	46.00	15.16	100.0	V	149.0	-6.8

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

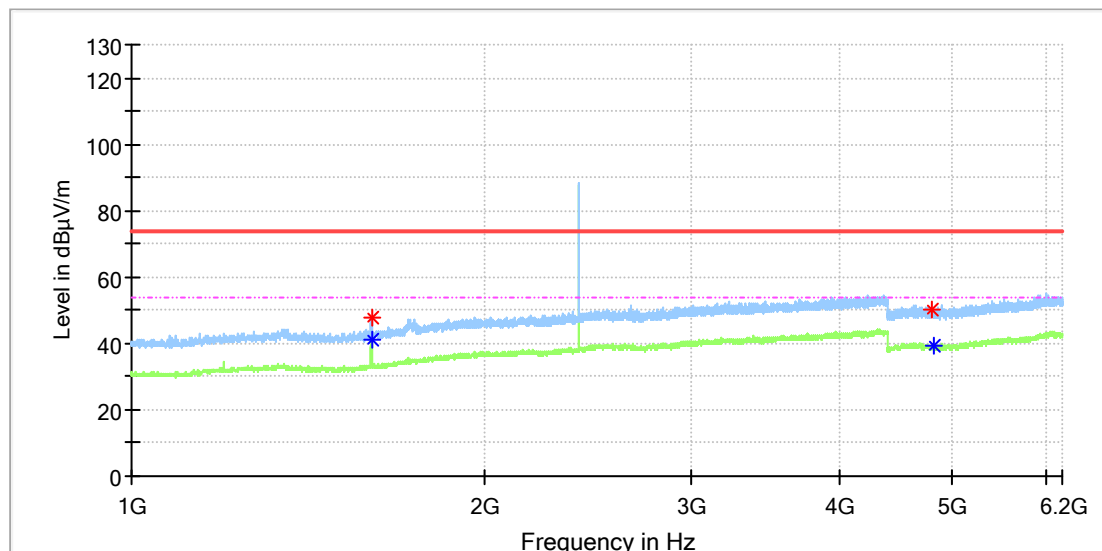
1GHz - 18GHz

Note: The highest waveform in the figure is Bluetooth Fundamental.

Test Report

EUT Information

EUT Name:	Car Audio
Model:	P2301
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	168457367/A003635657-002
Test Voltage::	DC 14V From DC Source
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1600.000000	47.56	---	74.00	26.44	150.0	H	256.0	2.1
1600.000000	---	40.81	54.00	13.19	150.0	H	256.0	2.1
4811.000000	50.43	---	74.00	23.57	150.0	H	321.0	11.8
4814.000000	---	39.35	54.00	14.65	150.0	H	184.0	11.8

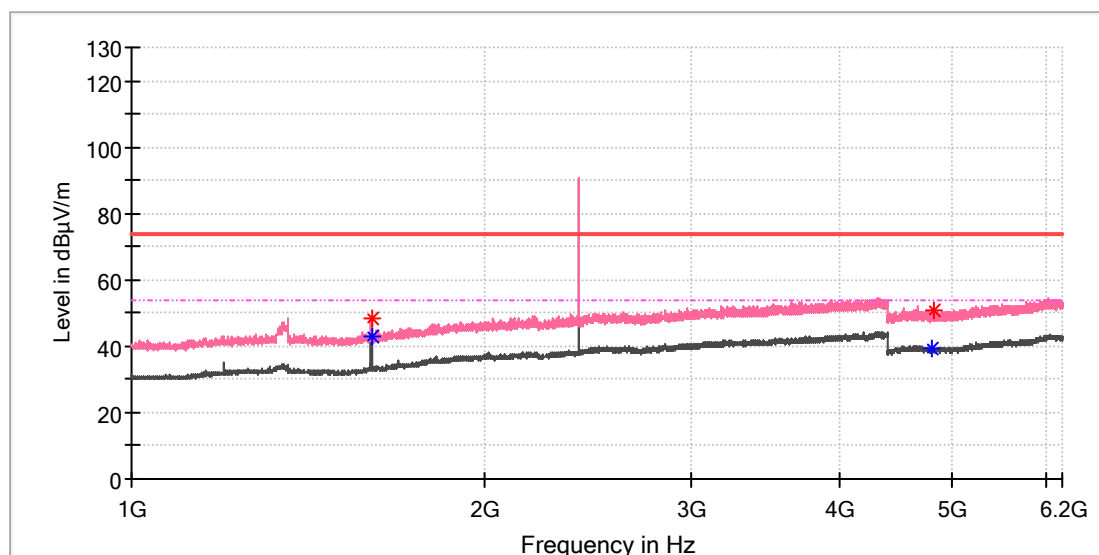
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name: Car Audio
 Model: P2301
 Test Mode: BR_DH5_Low channel
 Order No/Sample No: 168457367/A003635657-002
 Test Voltage:: DC 14V From DC Source
 Remark: Temp 23 Humi:56%
 Test Standard: FCC 15.247
 Tested By: Kei Zhang
 Reviewed By: Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1600.000000	48.37	---	74.00	25.63	150.0	V	135.0	2.1
1600.000000	---	42.97	54.00	11.03	150.0	V	135.0	2.1
4809.500000	---	39.34	54.00	14.66	150.0	V	80.0	11.8
4817.000000	50.92	---	74.00	23.08	150.0	V	285.0	11.8

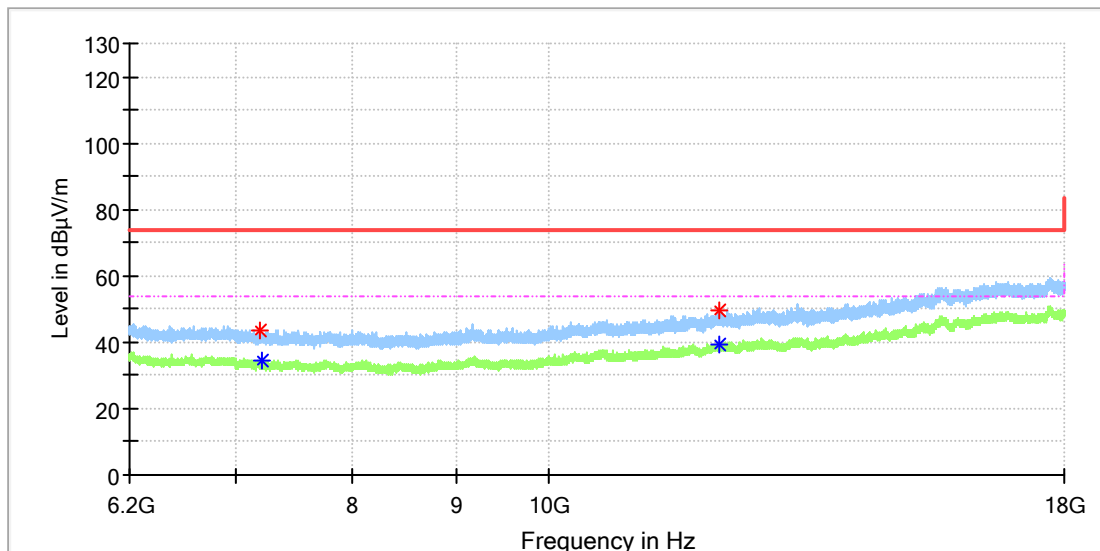
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name:	Car Audio
Model:	P2301
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	168457367/A003635657-002
Test Voltage::	DC 14V From DC Source
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7192.675000	43.45	---	74.00	30.55	150.0	H	131.0	8.8
7209.391667	---	34.54	54.00	19.46	150.0	H	0.0	8.8
12142.283333	49.58	---	74.00	24.42	150.0	H	266.0	14.4
12152.116667	---	39.60	54.00	14.40	150.0	H	290.0	14.4

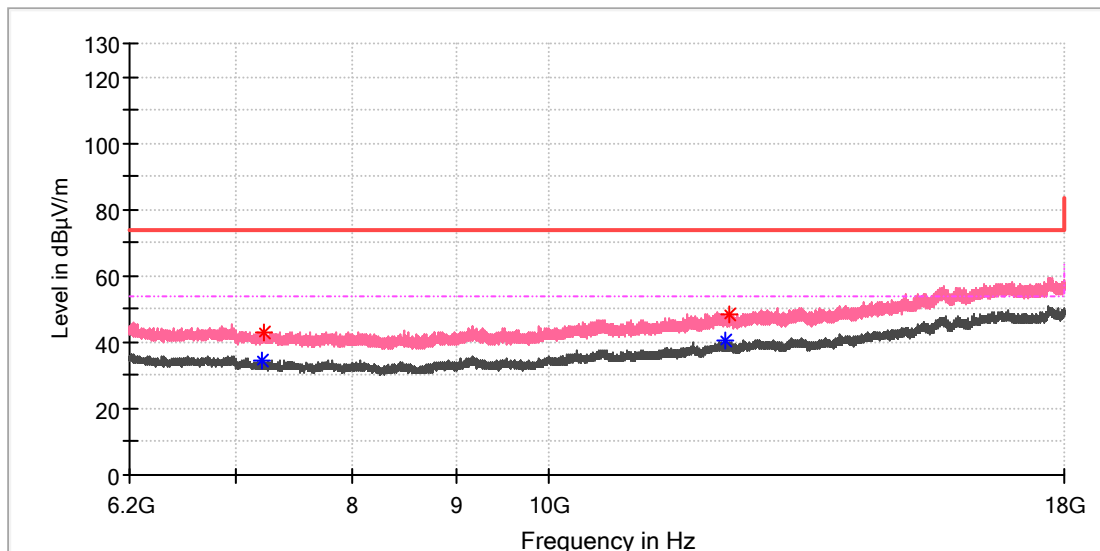
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name: Car Audio
Model: P2301
Test Mode: BR_DH5_Low channel
Order No/Sample No: 168457367/A003635657-002
Test Voltage:: DC 14V From DC Source
Remark: Temp 23 Humi:56%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7214.800000	---	34.18	54.00	19.82	150.0	V	68.0	8.7
7224.141667	42.80	---	74.00	31.20	150.0	V	241.0	8.7
12239.141667	---	40.75	54.00	13.25	150.0	V	68.0	14.7
12277.491667	48.57	---	74.00	25.43	150.0	V	22.0	14.8

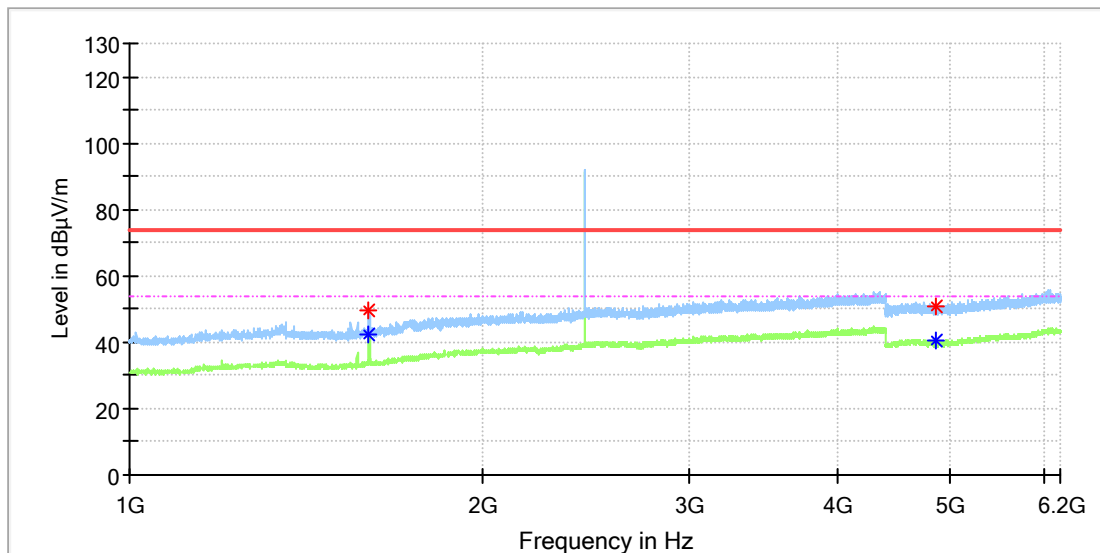
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---		---	---

Test Report

EUT Information

EUT Name:	Car Audio
Model:	P2301
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	168457367/A003635657-002
Test Voltage::	DC 14V From DC Source
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1599.500000	49.44	---	74.00	24.56	150.0	H	329.0	2.1
1599.500000	---	42.37	54.00	11.63	150.0	H	329.0	2.1
4858.000000	50.89	---	74.00	23.11	150.0	H	19.0	11.8
4863.500000	---	40.45	54.00	13.55	150.0	H	31.0	11.8

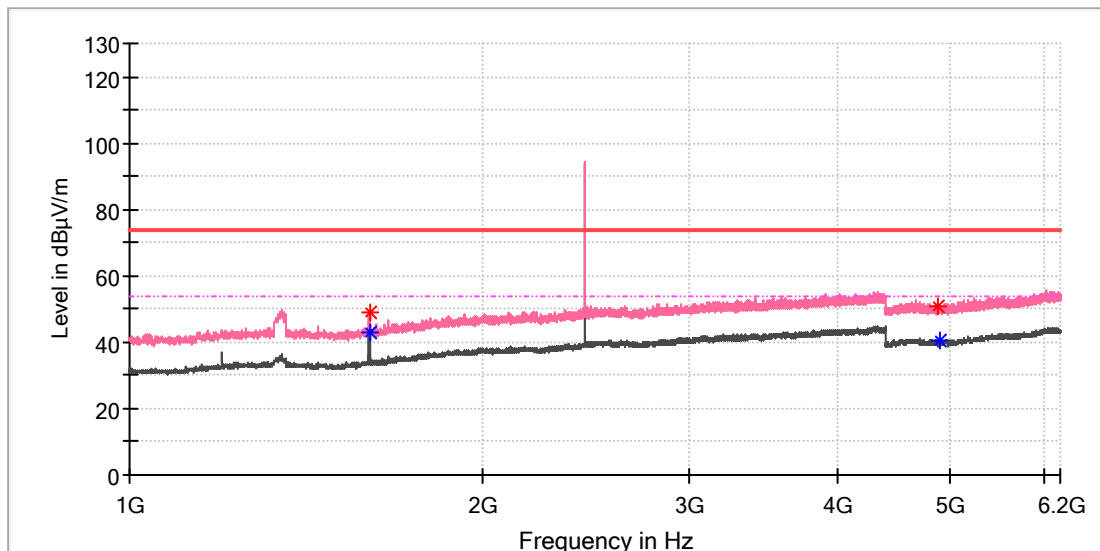
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name: Car Audio
Model: P2301
Test Mode: BR_DH5_Mid channel
Order No/Sample No: 168457367/A003635657-002
Test Voltage:: DC 14V From DC Source
Remark: Temp 23 Humi:56%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1600.000000	---	43.12	54.00	10.88	150.0	V	192.0	2.1
1600.500000	49.09	---	74.00	24.91	150.0	V	179.0	2.1
4875.500000	50.83	---	74.00	23.17	150.0	V	109.0	11.8
4904.500000	---	40.53	54.00	13.47	150.0	V	66.0	11.8

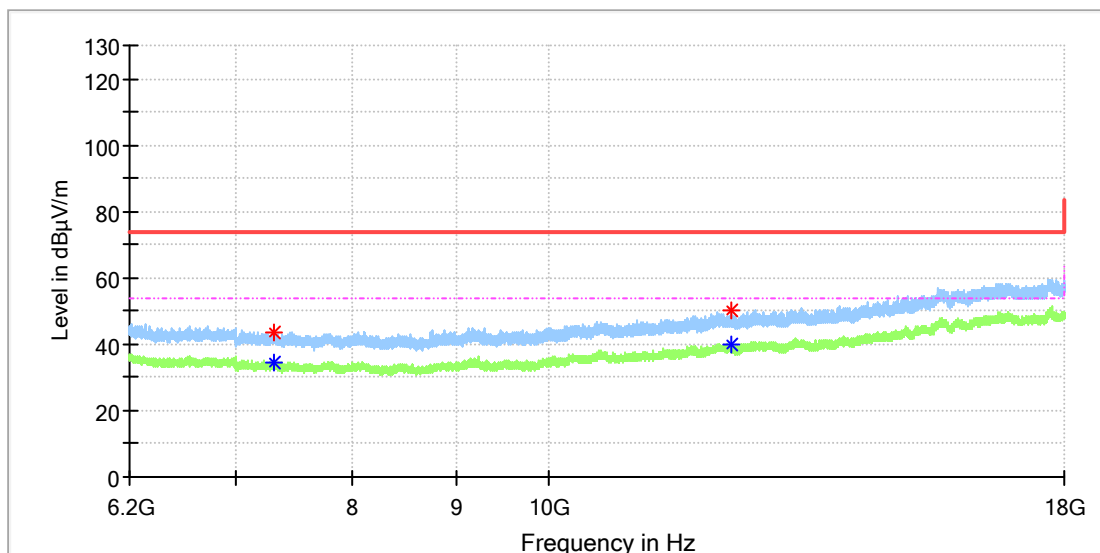
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name:	Car Audio
Model:	P2301
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	168457367/A003635657-002
Test Voltage::	DC 14V From DC Source
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7302.808333	---	34.61	54.00	19.39	150.0	H	325.0	8.3
7306.741667	43.39	---	74.00	30.61	150.0	H	0.0	8.3
12304.533333	50.31	---	74.00	23.69	150.0	H	278.0	14.9
12309.941667	---	40.12	54.00	13.88	150.0	H	110.0	14.9

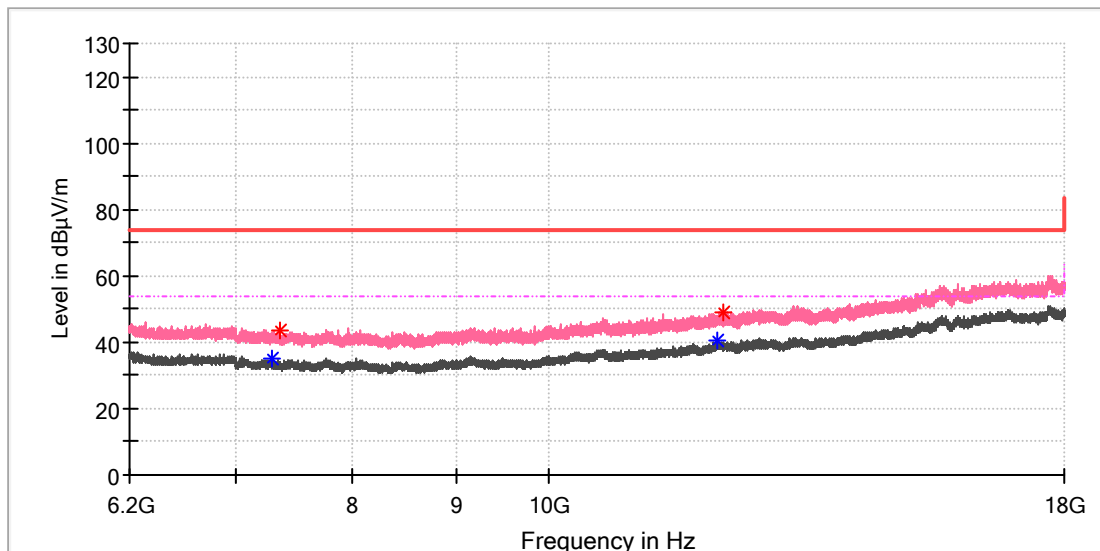
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name: Car Audio
Model: P2301
Test Mode: BR_DH5_Mid channel
Order No/Sample No: 168457367/A003635657-002
Test Voltage:: DC 14V From DC Source
Remark: Temp 23 Humi:56%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7297.891667	---	35.09	54.00	18.91	150.0	V	169.0	8.3
7363.775000	43.36	---	74.00	30.64	150.0	V	0.0	8.2
12127.533333	---	40.32	54.00	13.68	150.0	V	132.0	14.3
12190.466667	49.00	---	74.00	25.00	150.0	V	3.0	14.6

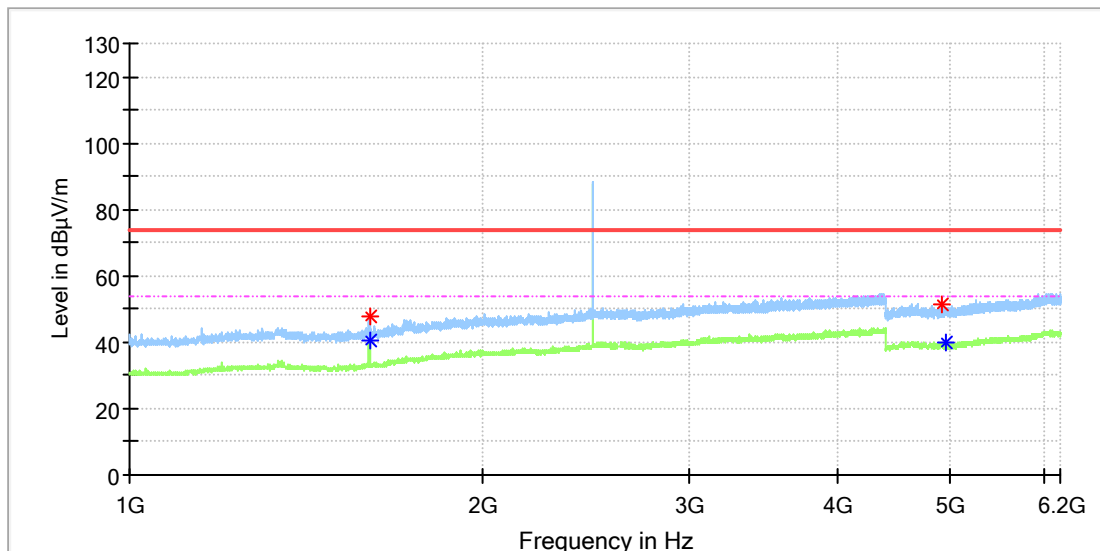
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---		---	---

Test Report

EUT Information

EUT Name: Car Audio
Model: P2301
Test Mode: BR_DH5_High channel
Order No/Sample No: 168457367/A003635657-002
Test Voltage:: DC 14V From DC Source
Remark: Temp 23 Humi:56%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1600.000000	47.90	---	74.00	26.10	150.0	H	34.0	2.1
1600.000000	---	40.70	54.00	13.30	150.0	H	34.0	2.1
4919.500000	51.47	---	74.00	22.53	150.0	H	3.0	11.8
4948.500000	---	39.73	54.00	14.27	150.0	H	3.0	11.8

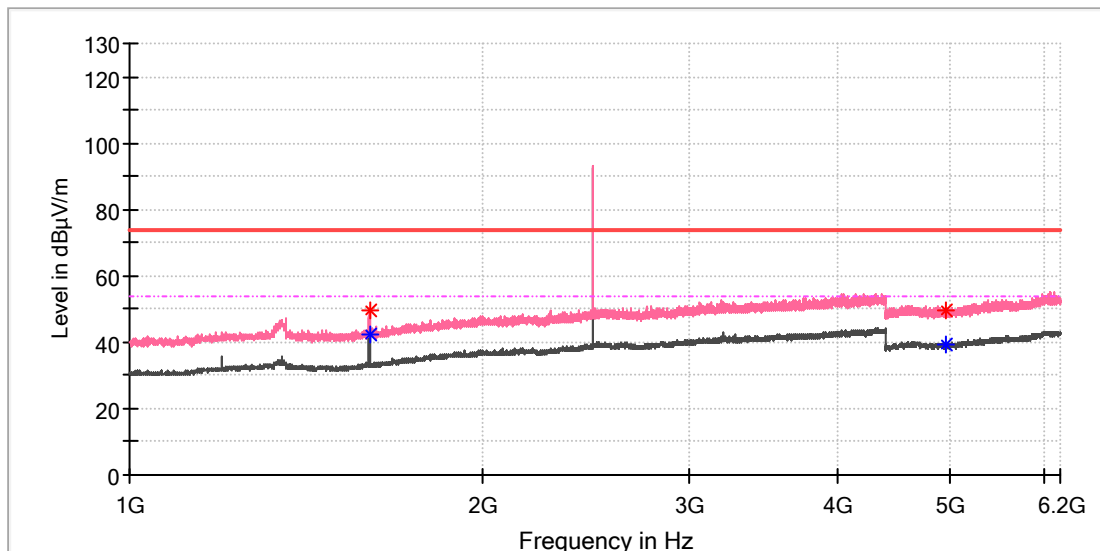
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name: Car Audio
Model: P2301
Test Mode: BR_DH5_High channel
Order No/Sample No: 168457367/A003635657-002
Test Voltage:: DC 14V From DC Source
Remark: Temp 23 Humi:56%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1600.000000	49.39	---	74.00	24.61	150.0	V	170.0	2.1
1600.000000	---	42.07	54.00	11.93	150.0	V	170.0	2.1
4949.000000	49.82	---	74.00	24.18	150.0	V	172.0	11.8
4956.500000	---	39.40	54.00	14.60	150.0	V	128.0	11.8

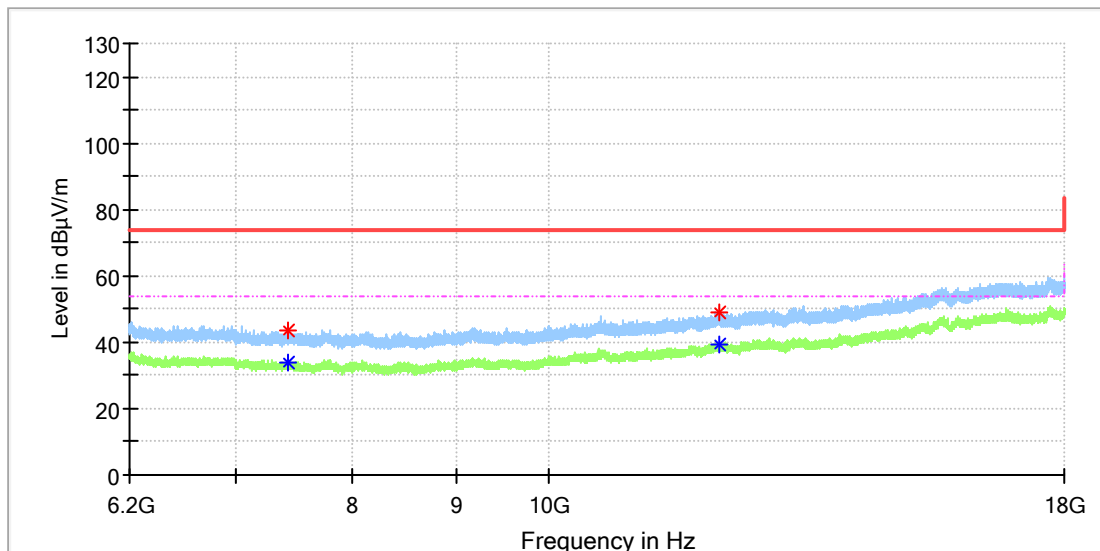
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name: Car Audio
Model: P2301
Test Mode: BR_DH5_High channel
Order No/Sample No: 168457367/A003635657-002
Test Voltage:: DC 14V From DC Source
Remark: Temp 23 Humi:56%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7429.658333	---	33.65	54.00	20.35	150.0	H	124.0	8.4
7433.591667	43.46	---	74.00	30.54	150.0	H	13.0	8.4
12131.958333	48.75	---	74.00	25.25	150.0	H	3.0	14.3
12148.675000	---	39.48	54.00	14.52	150.0	H	273.0	14.4

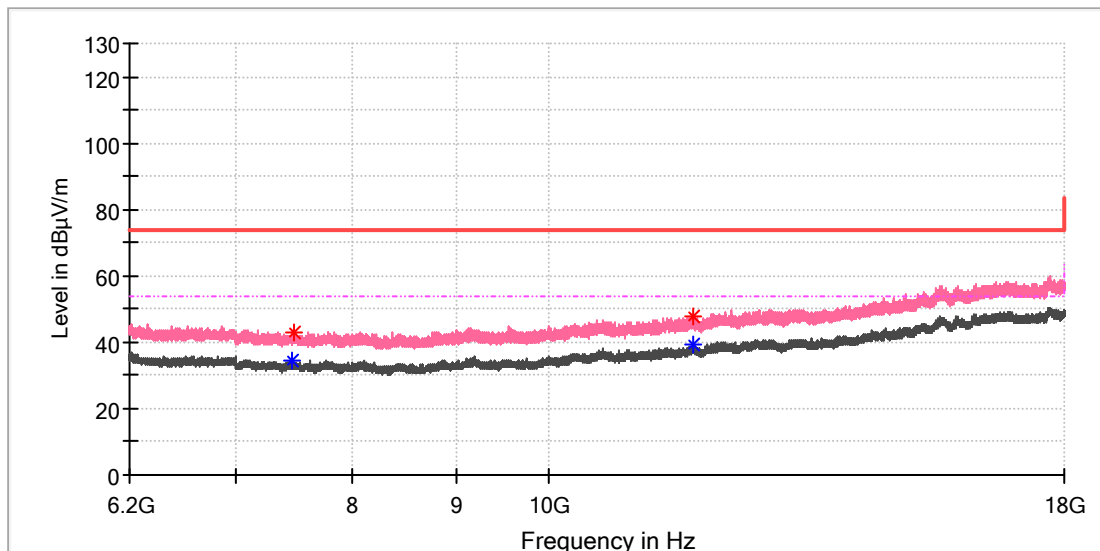
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Test Report

EUT Information

EUT Name: Car Audio
Model: P2301
Test Mode: BR_DH5_High channel
Order No/Sample No: 168457367/A003635657-002
Test Voltage:: DC 14V From DC Source
Remark: Temp 23 Humi:56%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7465.550000	---	34.33	54.00	19.67	150.0	V	35.0	8.6
7485.708333	43.04	---	74.00	30.96	150.0	V	265.0	8.7
11791.233333	48.02	---	74.00	25.98	150.0	V	0.0	13.4
11799.591667	---	39.44	54.00	14.56	150.0	V	158.0	13.4

Final Result

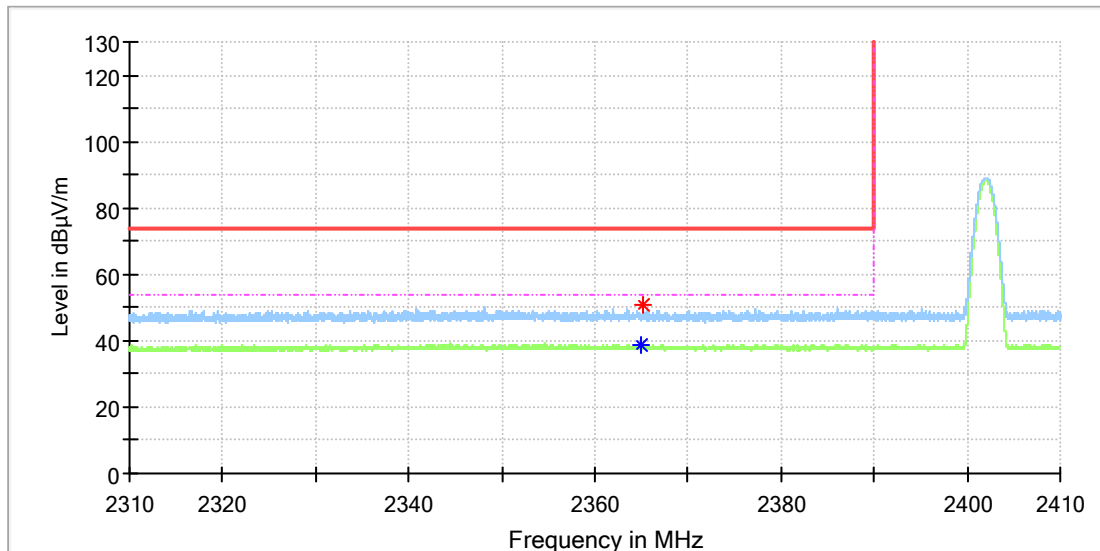
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
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Appendix A.9: Test Results of Radiated Emissions in Restricted Bands

Test Report

EUT Information

EUT Name: Car Audio
Model: P2301
Test Mode: BR_DH5_Low channel
Order No/Sample No: 168457367/A003635657-002
Test Voltage:: DC 14V From DC Source
Remark: Temp 23 Humi:56%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2364.970588	---	38.61	54.00	15.39	150.0	H	13.0	6.9
2365.235294	50.61	---	74.00	23.39	150.0	H	75.0	6.9

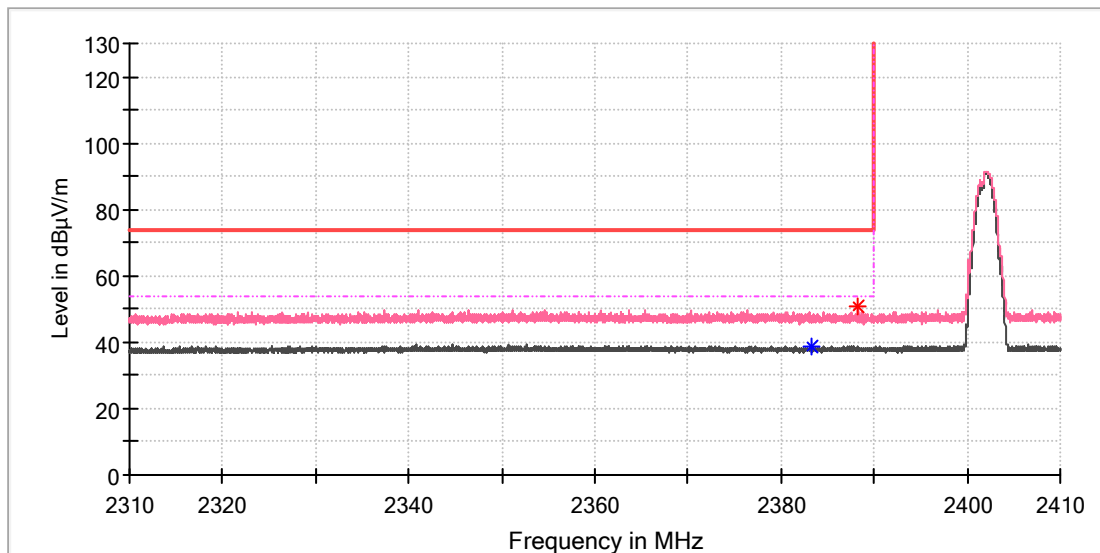
Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---		---	---

Test Report

EUT Information

EUT Name:	Car Audio
Model:	P2301
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	168457367/A003635657-002
Test Voltage::	DC 14V From DC Source
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2383.220588	---	38.63	54.00	15.37	150.0	V	0.0	7.0
2388.338235	50.60	---	74.00	23.40	150.0	V	139.0	7.0

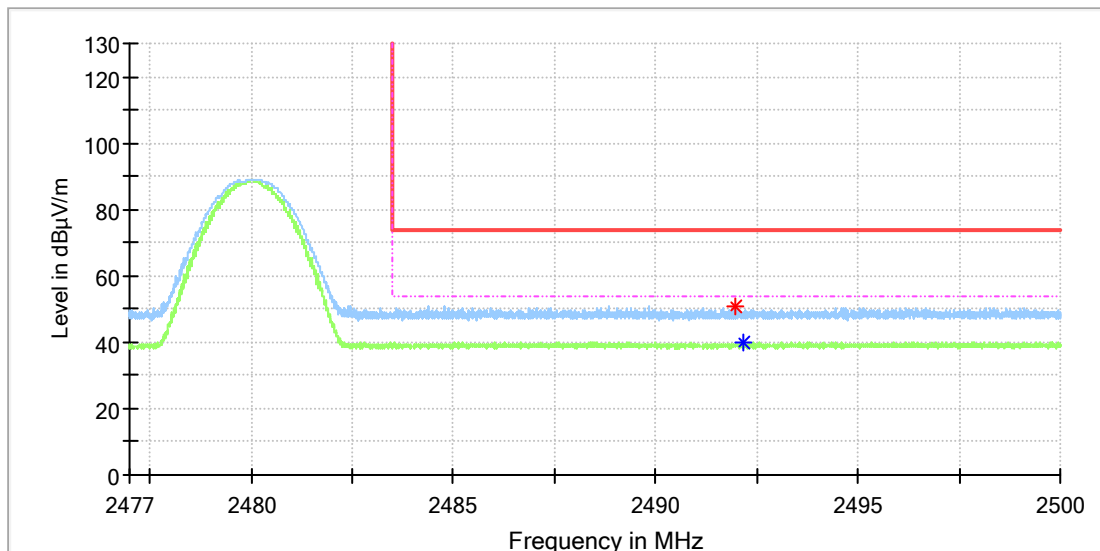
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---		---	---

Test Report

EUT Information

EUT Name:	Car Audio
Model:	P2301
Test Mode:	BR_DH5_High channel
Order No/Sample No:	168457367/A003635657-002
Test Voltage::	DC 14V From DC Source
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2491.957353	50.73	---	74.00	23.27	150.0	H	169.0	7.4
2492.177941	---	39.88	54.00	14.12	150.0	H	0.0	7.4

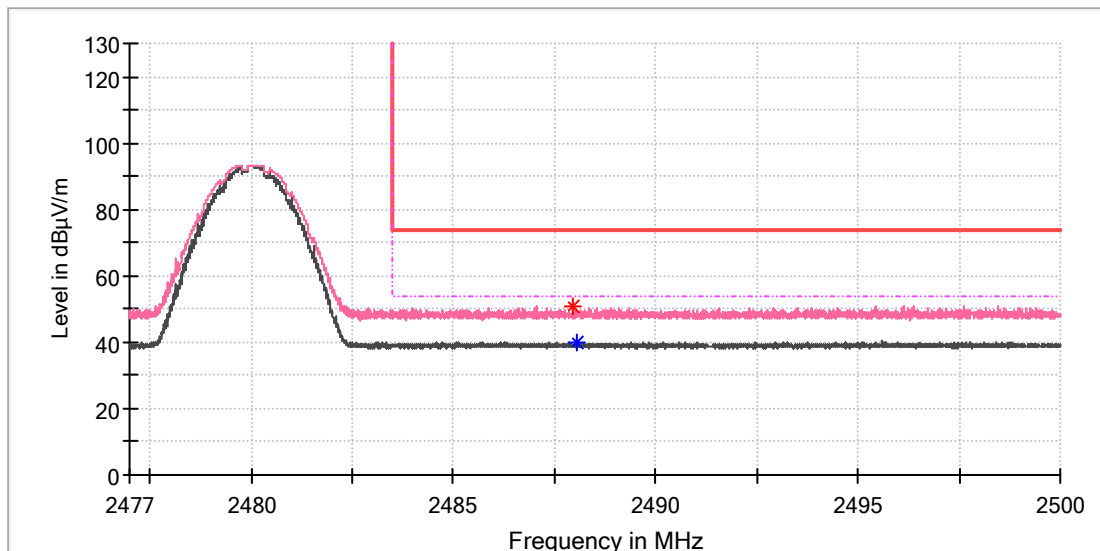
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---		---	---

Test Report

EUT Information

EUT Name:	Car Audio
Model:	P2301
Test Mode:	BR_DH5_High channel
Order No/Sample No:	168457367/A003635657-002
Test Voltage::	DC 14V From DC Source
Remark:	Temp 23 Humi:56%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2487.938235	51.05	---	74.00	22.95	150.0	V	96.0	7.4
2488.048530	---	39.61	54.00	14.39	150.0	V	12.0	7.4

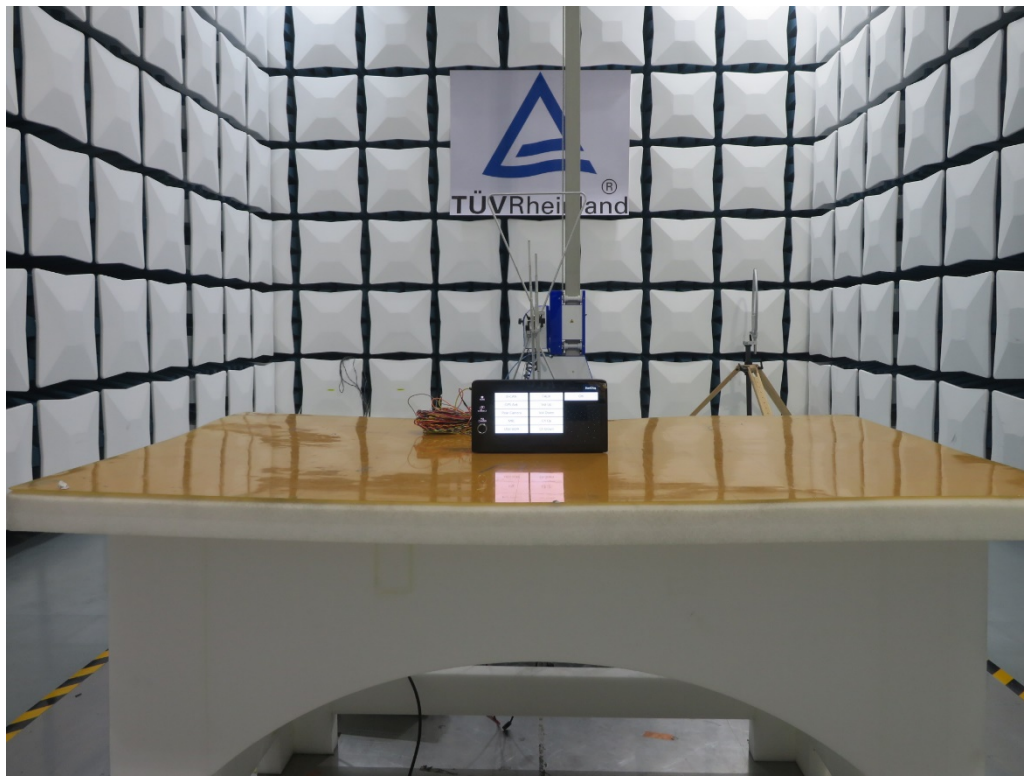
Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
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Appendix B: Photographs of the Test Set-Up

APPENDIX C: PHOTOGRAPHS OF THE TEST SET-UP	1
PHOTOGRAPH 1: SET-UP PHOTO FOR RADIATED SPURIOUS EMISSION, BELOW 1GHZ	2
PHOTOGRAPH 2: SET-UP PHOTO FOR RADIATED SPURIOUS EMISSION, ABOVE 1GHZ.....	2

Photograph 1: Set-up photo for Radiated Spurious Emission, below 1GHz



Photograph 2: Set-up photo for Radiated Spurious Emission, above 1GHz

