

FCC Test Report

(Class II Permissive Change)

Product Name	Car Audio
Model No.	55T0
FCC ID.	AX277S0

Applicant	Faurecia Clarion Electronics Co., Ltd.
Address	7-2, Shintoshin, Chuo-ku, Saitama Shi, Saitama, 330-0081 Japan

Date of Receipt	Aug. 20, 2021
Issued Date	Oct. 14, 2021
Report No.	2190843R-RFUSBT2V01-A
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report

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Applicant	Faurecia Clarion Electronics Co., Ltd.
Address	7-2, Shintoshin, Chuo-ku, Saitama Shi, Saitama, 330-0081 Japan
Manufacturer	Faurecia Clarion Electronics Co., Ltd.
Model No.	55T0
FCC ID.	AX277S0
EUT Rated Voltage	DC 12V by Battery
EUT Test Voltage	DC 12V by Battery
Trade Name	Clarion
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :




(Senior Project Specialist / Genie Chang)

Tested By :



(Senior Engineer / Ivan Chuang)

Approved By :



(Senior Engineer / Alan Chen)

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Revision History

Report No.	Version	Description	Issued Date
2190843R-RFUSBT2V01-A	V1.0	Initial issue of report.	2021-10-14

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Car Audio
Trade Name	Clarion
Model No.	55T0
FCC ID.	AX277S0
Frequency Range	2402-2480MHz
Channel Number	79
Type of Modulation	FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)
Antenna Type	PCB Antenna
Channel Control	Auto
Antenna Gain	Refer to the table "Antenna List"

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Clarion Malaysia Sdn.Bhd.	N/A	PCB Antenna	4dBi for 2.4GHz

Note: The antenna of EUT conforms to FCC 15.203.

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

Note:

1. The EUT is a Car Audio with built-in Bluetooth V2.1+EDR transceiver, this report for Bluetooth V2.1+EDR.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. This is to request a Class II permissive change for FCC ID: AX277S0, originally granted on 02/02/2021. The major change filed under this application is:
Change #1: Hardware changes: the size of monitor is changed from the 7-inch screen of the original model 77S0 to 9-inch screen variant model 55T0.

Test Mode	Mode 1: Transmit - 1Mbps Mode 2: Transmit - 3Mbps
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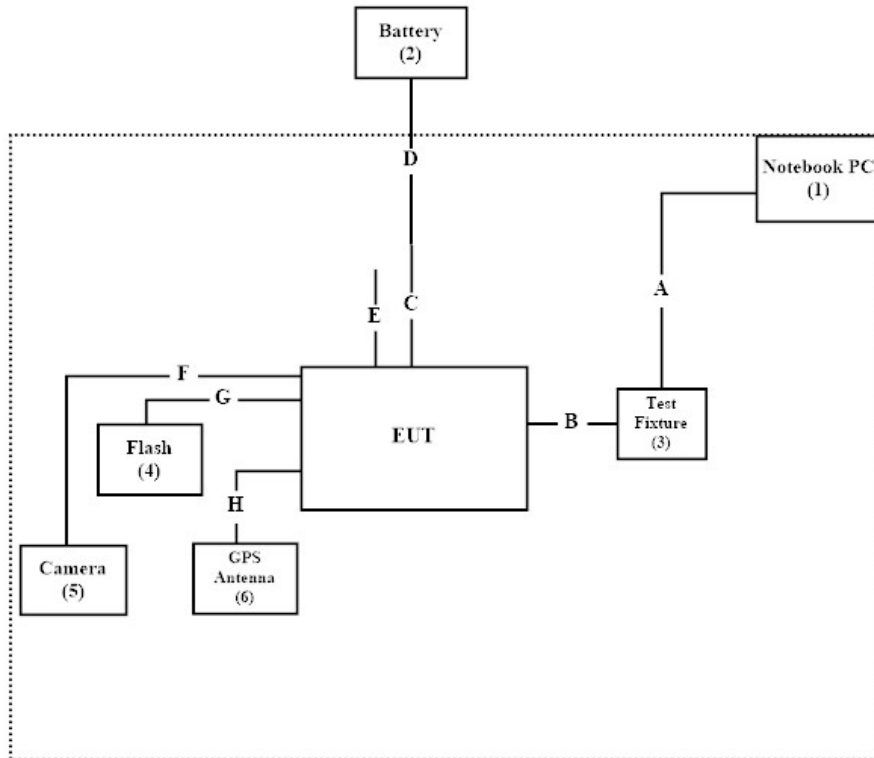
1.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord	
1	Notebook PC	DELL	Inspiron 15 3000	GT5JPJ2	N/A
2	Battery	YUASA	55B24L-CMF II	N/A	N/A
3	Test Fixture	Clarion	Clarion-01	N/A	N/A
4	Flash	Transcend	USB 3.0	N/A	N/A
5	Camera	NIPPON	56R	N/A	N/A
6	GPS Antenna	MITSUMI	R16-A551	N/A	N/A

Signal Cable Type	Signal cable Description	
A	USB Code	Shielded, 1.8m
B	Signal Cable	Non-shielded, 0.15m
C	Power Cable	Non-shielded, 0.5m
D	Power Cable	Non-shielded, 2m
E	Signal Cable	Non-shielded, 0.15m
F	Camera Cable	Non-shielded, 1.2m
G	USB Cable	Non-shielded, 0.55m
H	GPS Antenna Cable	Non-shielded, 0.6m

1.3. Configuration of Tested System



1.4. EUT Exercise Software

1. Setup the EUT as shown in Section 1.3.
2. Execute software “Broadcom Blue Tool v1.9.3.7” on the Notebook PC.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous Transmit.
5. Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40 °C	24.6 °C
	Humidity (%RH)	10~90 %	62.4 %

USA : **FCC Registration Number: TW0033**

Canada : **IC Registration Number: 26930**

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No. 26, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan
Phone number : 886-3-275-7255
Fax number : 866-3-327-5505
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.6. List of Test Equipment

For Conducted measurements /SH2

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
X	Spectrum Analyzer	R&S	FSV30	103464	2021.03.25	2022.03.24
X	Power Meter	Anritsu	ML2496A	1548002	2021.02.24	2022.02.23
X	Power Sensor	Anritsu	MA2411B	1531023	2021.02.24	2022.02.23
X	Power Sensor	Anritsu	MA2411B	1531022	2021.02.24	2022.02.23

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Testing System V2.0.

For Radiated measurements / 966-3

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
	Loop Antenna	AMETEK	HLA6121	56736	2021.04.14	2022.04.13
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-678	2020.09.04	2021.09.03
V	Horn Antenna	ETS-Lindgren	3117	00201259	2020.10.23	2021.10.22
	Horn Antenna	Com-Power	AH-840	101087	2020.06.08	2021.06.07
V	Pre-Amplifier	EMCI	EMC05820SE	980302	2020.07.08	2021.07.07
V	Pre-Amplifier	EMCI	EMC051835SE	980313	2020.11.25	2021.11.24
	Pre-Amplifier	EMCI	EMC05820SE	980310	2021.07.07	2022.07.06
	Pre-Amplifier	EMCI	EMC184045SE	980314	2021.06.24	2022.06.23
V	Filter	MICRO TRONICS	BRM50702	G251	2021.09.16	2022.09.15
	Filter	MICRO TRONICS	BRM50716	G188	2021.09.16	2022.09.15
V	EMI Test Receiver	R&S	ESR	102793	2020.12.17	2021.12.16
V	Spectrum Analyzer	R&S	FSV3044	101113	2021.02.03	2022.02.02
V	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2021.03.03	2022.03.02
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2020.06.10	2021.06.09

Note:

4. All equipments are calibrated every one year.
5. The test instruments marked with “X” are used to measure the final test results.
6. Test Software version : DEKRA Testing System V2.0. / AUDIX e3 V9

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

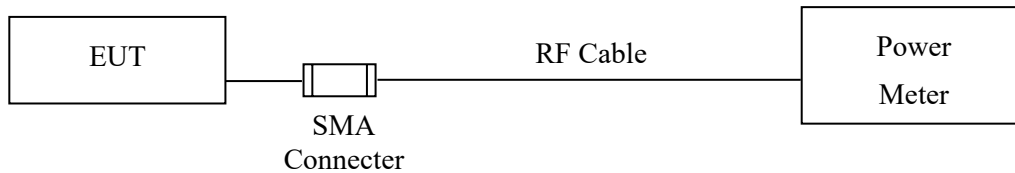
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Radiated Emission	Under 1GHz ± 4.06 dB	Above 1GHz ± 3.73 dB

2. Peak Power Output

2.1. Test Setup



2.2. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

2.3. Test Procedure

Tested according to FHSS test procedure of KDB 558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

2.4. Test Result of Peak Power Output

Product : Car Audio
Test Item : Peak Power Output
Test Mode : Mode 1: Transmit - 1Mbps
Test Date : 2021/10/13

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	-2.25	0.125W = 20.97dBm	Pass
Channel 39	2441.00	-1.41	0.125W = 20.97dBm	Pass
Channel 78	2480.00	-0.98	0.125W = 20.97dBm	Pass

Note: For AFH mode using 20 hopping channels, the maximum output power limit is 0.125W.

Product : Car Audio
Test Item : Peak Power Output
Test Mode : Mode 2: Transmit - 3Mbps
Test Date : 2021/10/13

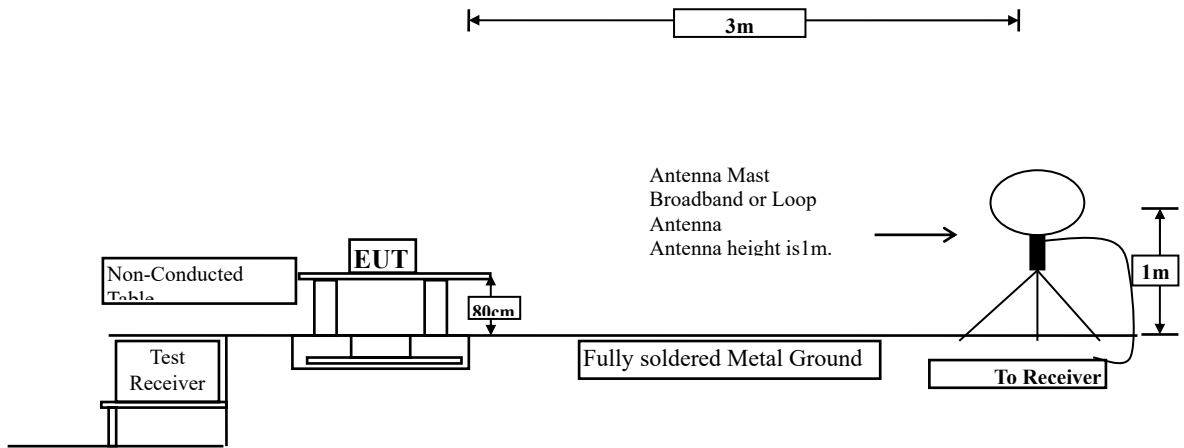
Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	-3.23	0.125W = 20.97dBm	Pass
Channel 39	2441.00	-2.98	0.125W = 20.97dBm	Pass
Channel 78	2480.00	-2.74	0.125W = 20.97dBm	Pass

Note: For AFH mode using 20 hopping channels, the maximum output power limit is 0.125W.

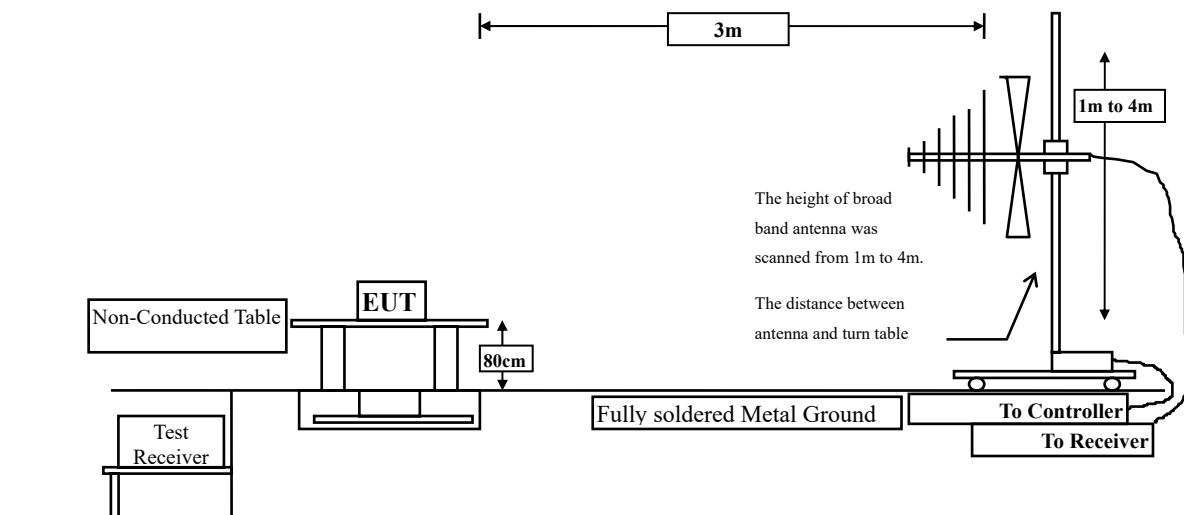
3. Radiated Emission

3.1. Test Setup

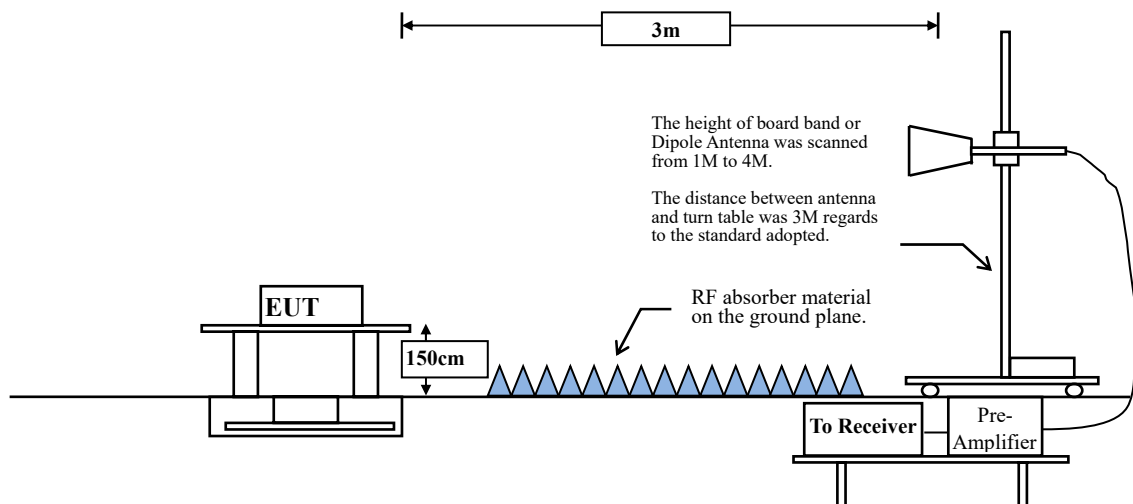
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.2. Limits

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

- Remarks:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

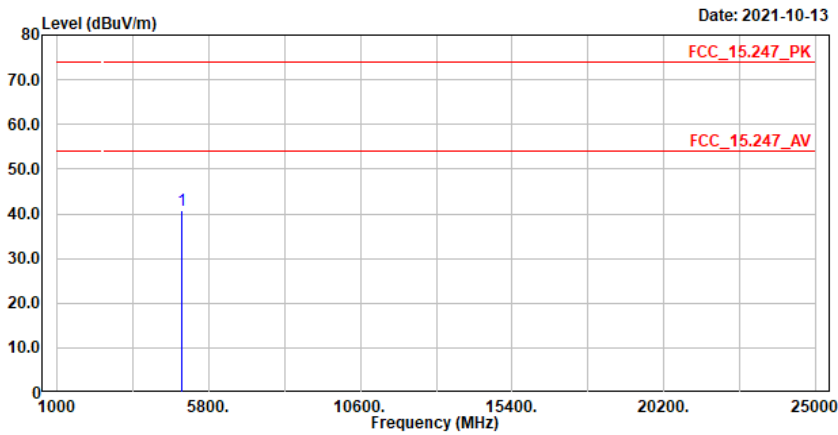
The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

3.4. Test Result of Radiated Emission

Product : Car Audio
 Test Item : Harmonic Radiated Emission

Horizontal

Site :966-3
 Condition :3m ,HORIZONTAL
 Mode :TX_BT_DH5_2480MHz
 TEST BY :Carlos Chen



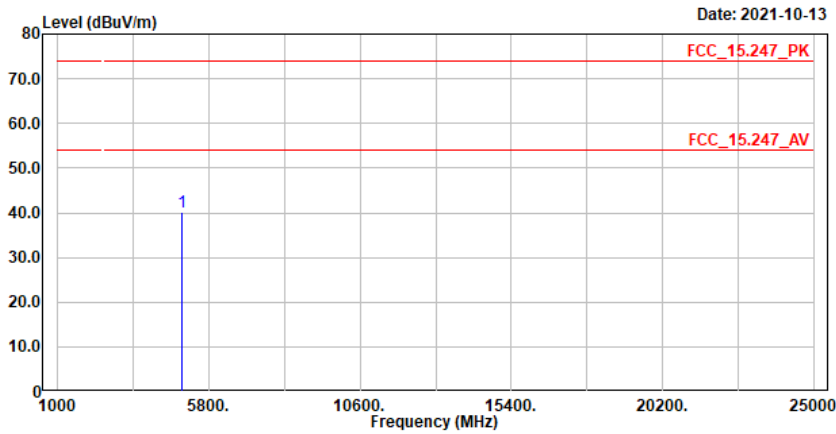
No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4960.000	40.64	74.00	-33.36	39.94	0.70	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line

Product : Car Audio
 Test Item : Harmonic Radiated Emission

Vertical

Site :966-3
 Condition :3m ,VERTICAL
 Mode :TX_BT_DH5_2480MHz
 TEST BY :Carlos Chen

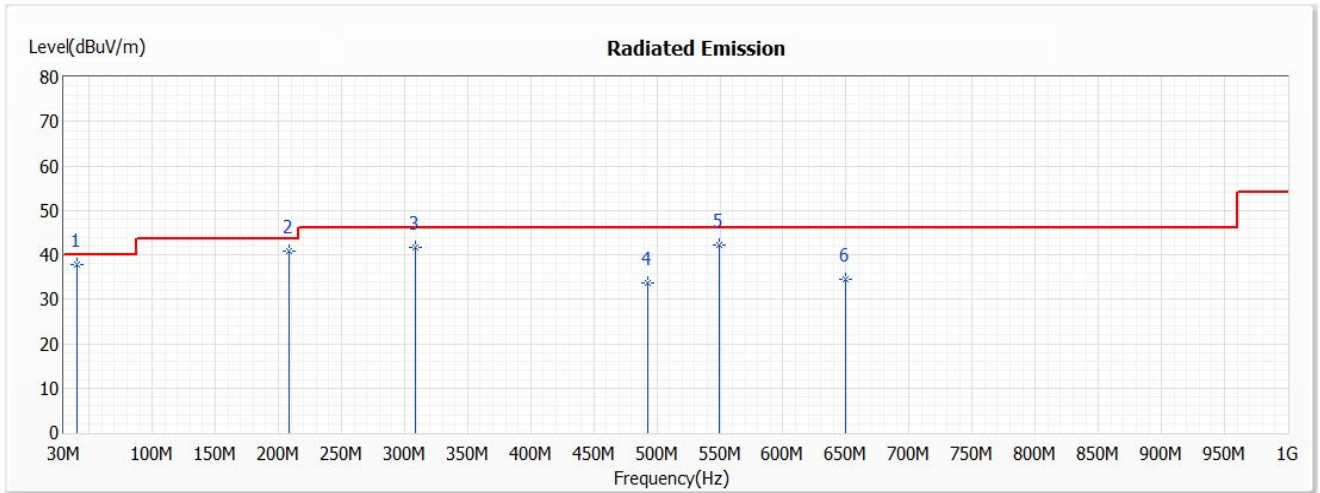


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	4960.000	40.18	74.00	-33.82	39.48	0.70	Peak

- Note:
1. Level = Read Level + Factor
 2. Factor = Antenna- Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line

Product : Car Audio
 Test Item : General Radiated Emission
 Test Mode : Mode 2: Transmit - 3Mbps (2441MHz)
 Test Date : 2021/07/07

Horizontal



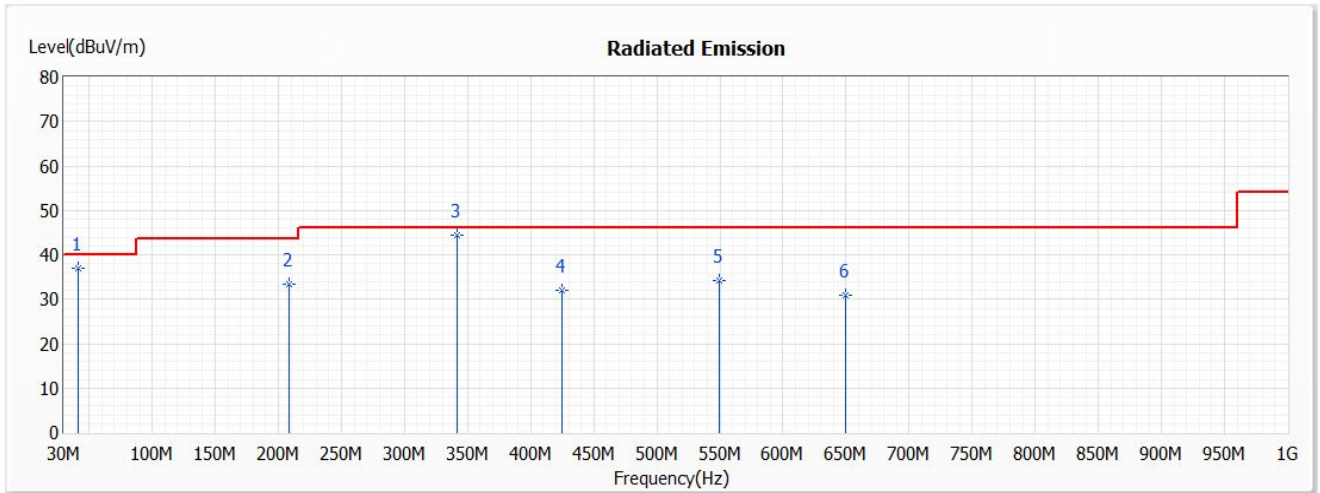
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	40.670	37.87	40.00	-2.13	41.31	-3.44	QP
2	208.480	40.75	43.50	-2.75	46.89	-6.14	QP
3	308.390	41.66	46.00	-4.34	44.15	-2.49	QP
4	492.690	33.64	46.00	-12.36	31.98	1.66	QP
5	549.920	42.25	46.00	-3.75	39.31	2.94	QP
6	649.830	34.40	46.00	-11.60	29.75	4.65	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Car Audio
 Test Item : General Radiated Emission
 Test Mode : Mode 2: Transmit - 3Mbps (2441MHz)
 Test Date : 2021/07/07

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	41.640	36.94	40.00	-3.06	40.28	-3.34	QP
2	208.480	33.47	43.50	-10.03	39.61	-6.14	QP
* 3	341.370	44.33	46.00	-1.67	45.98	-1.65	QP
4	424.790	31.94	46.00	-14.06	31.50	0.44	QP
5	549.920	34.28	46.00	-11.72	31.34	2.94	QP
6	649.830	31.01	46.00	-14.99	26.36	4.65	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

4. EMI Reduction Method During Compliance Testing

No modification was made during testing.