Prüfbericht-Nr.: *Test report no.:*	**CN22BZUG 001**	**Auftrags-Nr.:** *Order no.:*	**168373325**	**Seite 1 von 25** *Page 1 of 25*
Kunden-Referenz-Nr.: *Client reference no.:*	**N/A**	**Auftragsdatum:** *Order date:*	2022-05-19	
Auftraggeber: *Client:*	**United Automotive Electronic Systems Co., Ltd.** No. 555 Rong Qiao Road, Pudong New Area, Shanghai, China			
Prüfgegenstand: *Test item:*	Body control module			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	GEM LV2.1 PEPS			
Auftrags-Inhalt: *Order content:*	Test Report			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part15: Subpart C Section 15.209			
Wareneingangsdatum: *Date of sample receipt:*	2022-05-19	Please refer to photo documents		
Prüfmuster-Nr.: *Test sample no:*	A003256798-004			
Prüfzeitraum: *Testing period:*	2022-05-19 to 2022-05-25			
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:*	Hardy Suo	**genehmigt von:** *authorized by:*	Lin Lin
Datum: *Date:* 2022-06-06		**Ausstellungsdatum:** *Issue date:* 2022-06-06	
Stellung / *Position:*	Sachverständige(r) / Expert	**Stellung** / *Position:*	Sachverständige(r) / Expert
Sonstiges / *Other:*	FCC ID: 2AMR2PEPS21		

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.
V05

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass
5.1.2 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 appendixes: None.

2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd. (A2LA Certificate Number: 5162.01)

No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China

FCC Accreditation Designation No.: CN1260

ISED Wireless Device Testing Laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equip. No.	Description	Manufacturer	Model	Serial No.	Calibrated until (DD.MM.YYYY)
G1826021	EMI Test Receiver	R&S	ESR 7	102021	10.08.2022
G1826023	Signal Analyzer	R&S	FSV 40	101439	09.08.2022
G1826024	System Controller Interface	R&S	SCI-100	S10010038	N/A
G1826025	Filterbank	R&S	Wlan	100759	09.08.2022
G1826026	OSP	R&S	OSP 120	102040	N/A
G1826028	Pre-amplifier	R&S	SCU08F1	08320031	09.08.2022
G1826029	Amplifier	R&S	SCU-18F	180070	09.08.2022
G1826030	Amplifier	R&S	SCU40A	100475	09.08.2022
G1826031	Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	08.08.2022
G1826032	Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	08.08.2022
G1826033	Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	08.08.2022
G1826034	Active Loop Antenna	Schwarzbeck	FMZB 1513	302	13.09.2022
G1826036	Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
G1826037	Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
G1826433	3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	22.06.2024

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, 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 basics using in house standards or comparisons.

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	±1 x 10^{-7}
3	Radiated Emission of Transmitter, valid up to 26.5 GHz	±6 dB
4	Radiated Emission of Receiver, valid up to 26.5 GHz	±6 dB
5	Radiated Emission (3m SAC), 30MHz to 1000MHz	±4.52 dB
6	Radiated Emission (3m SAC), above 1000MHz	±4.37 dB
7	Temperature	±1 °C
8	Humidity	±5 %
9	Voltage (DC)	±1 %
10	Voltage (AC, <10kHz)	±2 %

2.6 Location of Original Data

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

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People’s Republic of 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 EUT is a vehicular instrument Body control module (M/N: GEM LV2.1 PEPS) which that supports RFID 125 kHz and 433.92MHz wireless technologies.

For details refer to user manual and circuit diagram.

3.2 Ratings and System Details

Table 3: Technical Specification

Technical Specification	Value
Product Name	Body control module
Model	GEM LV2.1 PEPS
Brand Name	UAES
FCC ID	2AMR2PEPS21
Operating Frequency	Tx: 125kHz Rx: 433.92MHz
Modulation	ASK
Antenna Number	2 (1 for 125kHz, 1 for 433.92MHz)
Antenna Type	Ferrite loop antenna for 125kHz Micro strip monopole antenna for 433.92MHz
Antenna Gain	0dBi max
Operation Voltage	DC 12V
Operation Temperature	-40 °C ~ 85 °C

3.3 Independent Operation Modes

The basic operation modes are:

A. Transmission
B. Standby

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Circuit Diagram
- Instruction Manual
- Rating Label

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power 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 testing were performed according to the procedures in ANSI C63.10: 2013.

4.3 Special Accessories and Auxiliary Equipment

The EUT was tested together with the following accessories:

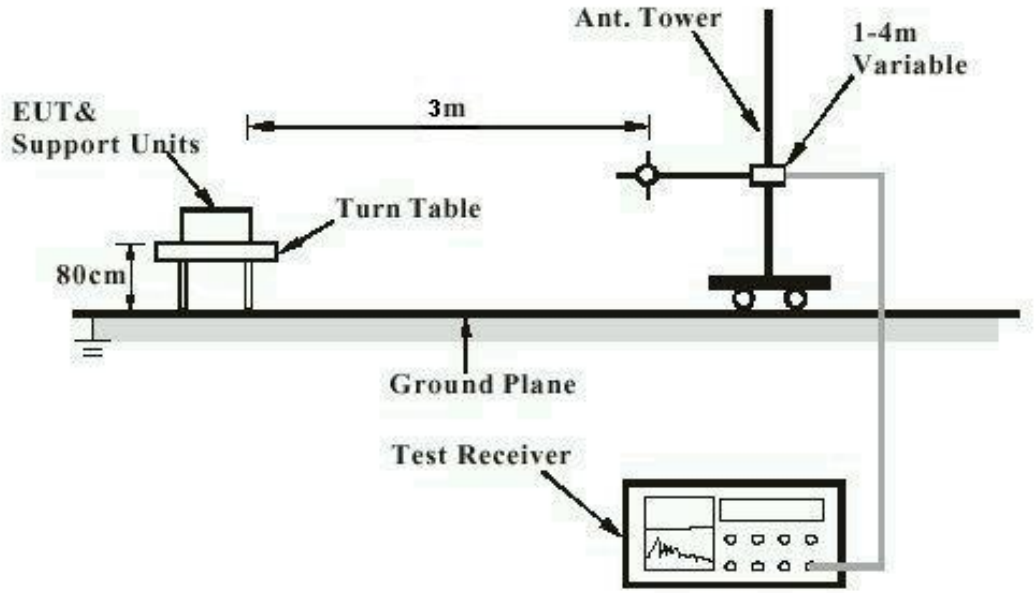
Description	Manufacturer	Model	S/N	Note
-	-	-	-	-

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard FCC Part 15.203

The EUT has a Ferrite loop antenna for 125kHz transmitter with gain 0 dBi max. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Spurious Emission

RESULT: **Pass**

Test Specification

Date of testing	:	2022-05-19 to 2022-05-25
Test standard	:	FCC part 15.209
Basic standard	:	ANSI C63.10: 2013
Limits	:	FCC part 15.209(a)
Kind of test site	:	3m Semi-Anechoic Chamber & Anechoic Chamber

Test setup

Test Channel	:	125 kHz
Operation mode	:	A
Ambient temperature	:	Refer to test plot
Relative humidity	:	Refer to test plot
Atmospheric pressure	:	101kPa

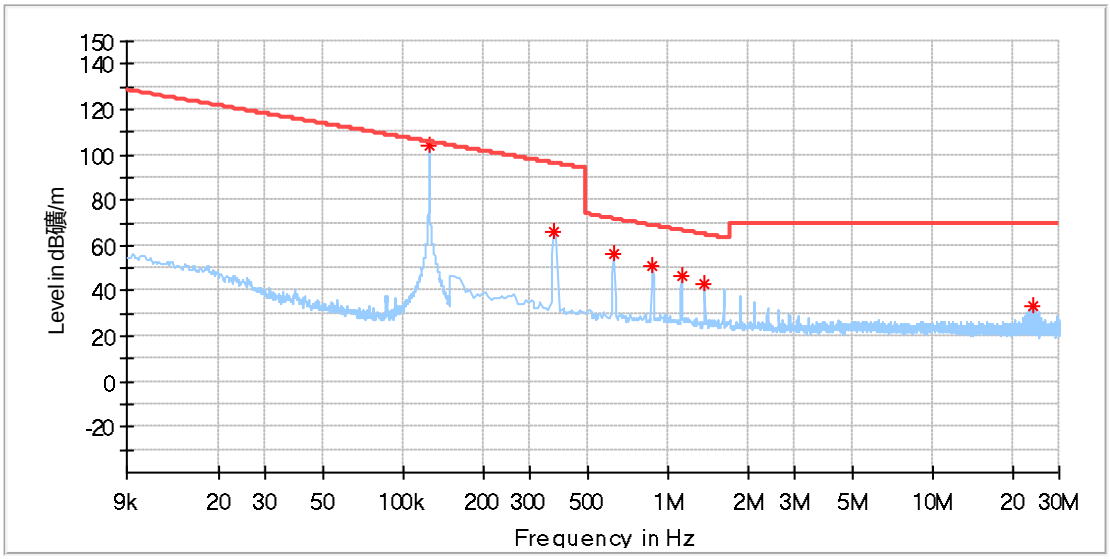
Test plot as below.

5.1.2.1 9 kHz – 30 MHz

Test Report

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: X
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

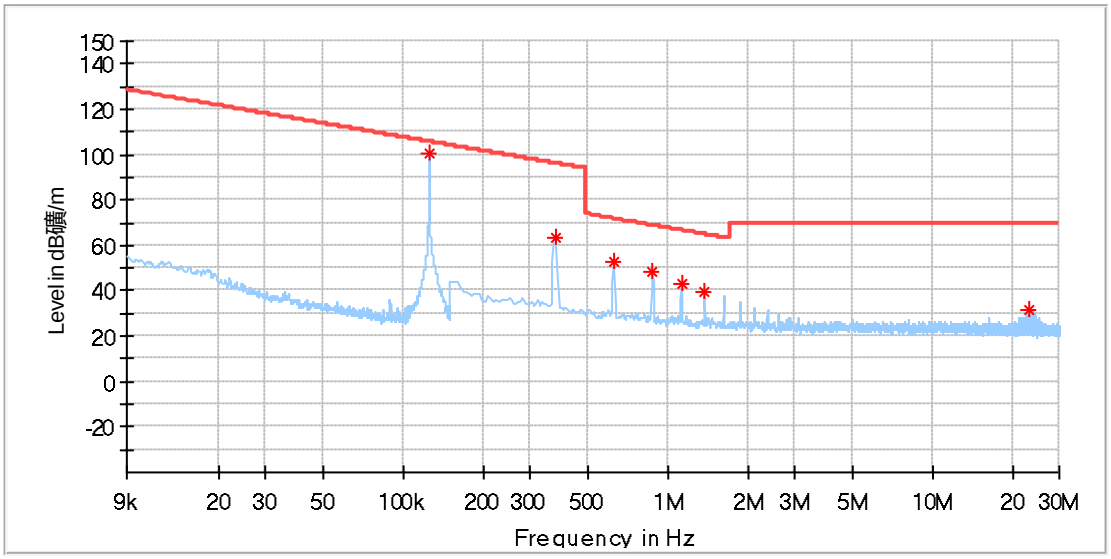
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.125023	104.12	105.66	1.54	100.0	V	346.0	20.1
0.369485	65.94	96.25	30.31	100.0	V	339.0	20.1
0.619699	56.43	71.77	15.33	100.0	V	189.0	20.1
0.874302	50.91	68.79	17.87	100.0	V	342.0	20.1
1.124515	46.54	66.61	20.06	100.0	V	197.0	20.1
1.374728	43.07	64.87	21.79	100.0	V	348.0	20.1
23.999272	33.35	69.50	36.15	100.0	V	280.0	20.6

Final_Result

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

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: Y
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

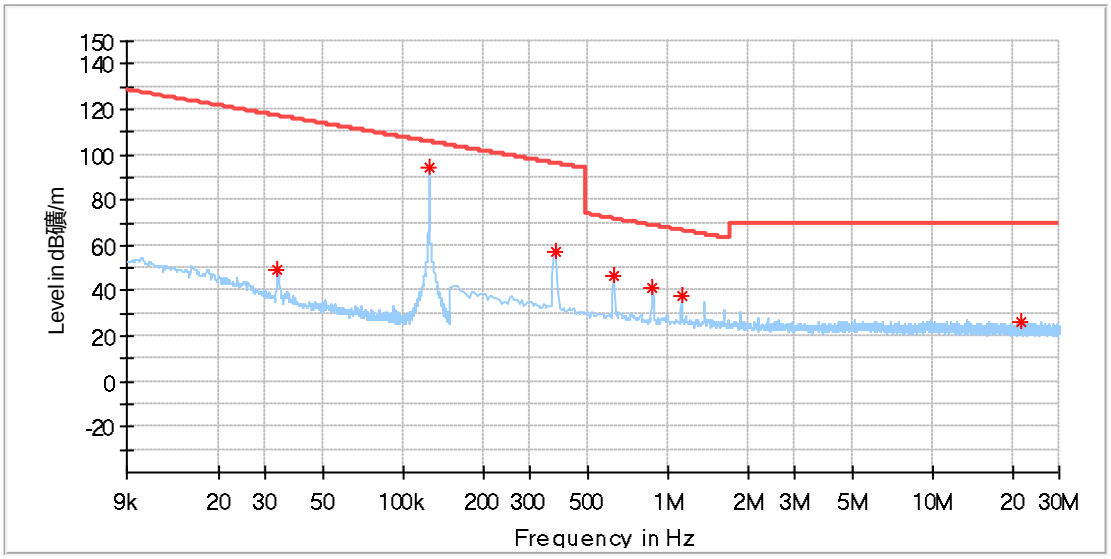
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.125023	100.95	105.66	4.71	100.0	V	267.0	20.1
0.373875	63.28	96.15	32.87	100.0	V	258.0	20.1
0.619699	53.17	71.77	18.60	100.0	V	262.0	20.1
0.874302	48.06	68.79	20.72	100.0	V	258.0	20.1
1.124515	43.44	66.61	23.16	100.0	V	251.0	20.1
1.374728	39.67	64.87	25.19	100.0	V	258.0	20.1
22.998419	31.63	69.50	37.87	100.0	V	102.0	20.6

Final_Result

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

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: Z
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
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)
0.033474	49.63	117.10	67.46	100.0	V	127.0	20.1
0.125023	94.29	105.66	11.37	100.0	V	193.0	20.1
0.373875	56.98	96.15	39.17	100.0	V	197.0	20.1
0.619699	46.96	71.77	24.81	100.0	V	197.0	20.1
0.874302	41.25	68.79	27.53	100.0	V	178.0	20.1
1.124515	37.40	66.61	29.20	100.0	V	178.0	20.1
21.466412	25.85	69.50	43.65	100.0	V	205.0	20.6

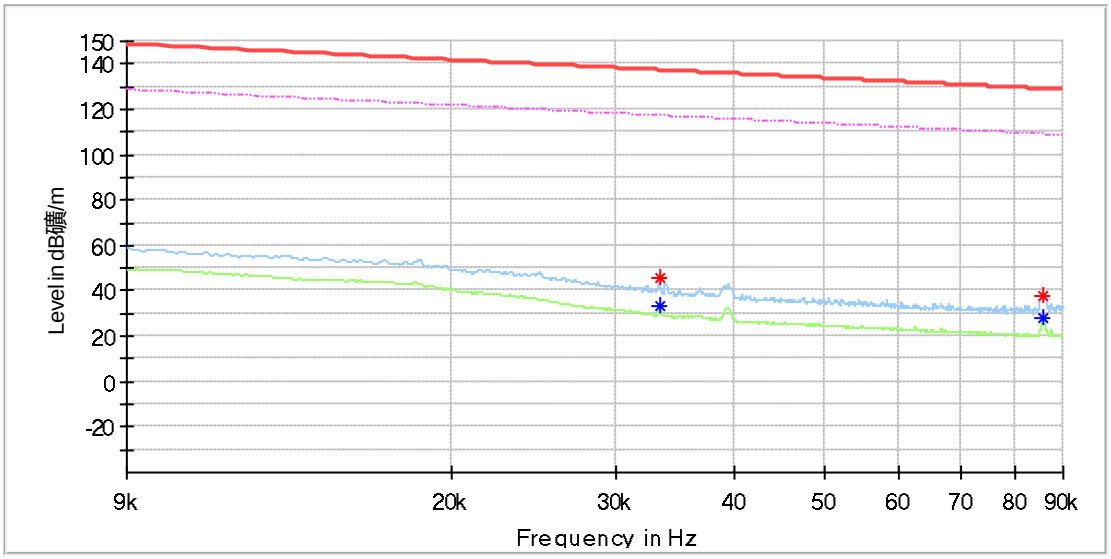
Final_Result

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

5.1.2.2 9 kHz – 90 kHz

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: X
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

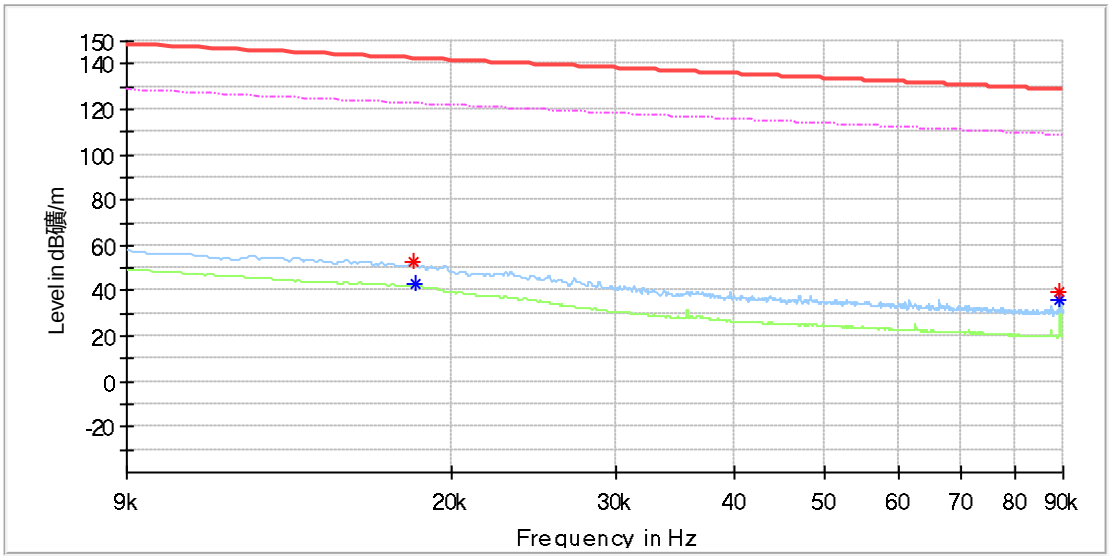


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.033358	45.60	---	137.13	91.53	100.0	V	127.0	20.0
0.033358	---	33.54	117.13	83.59	100.0	V	127.0	20.0
0.085545	---	27.94	108.95	81.02	100.0	V	178.0	20.0
0.085719	37.86	---	128.93	91.08	100.0	V	178.0	20.0

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: Y
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

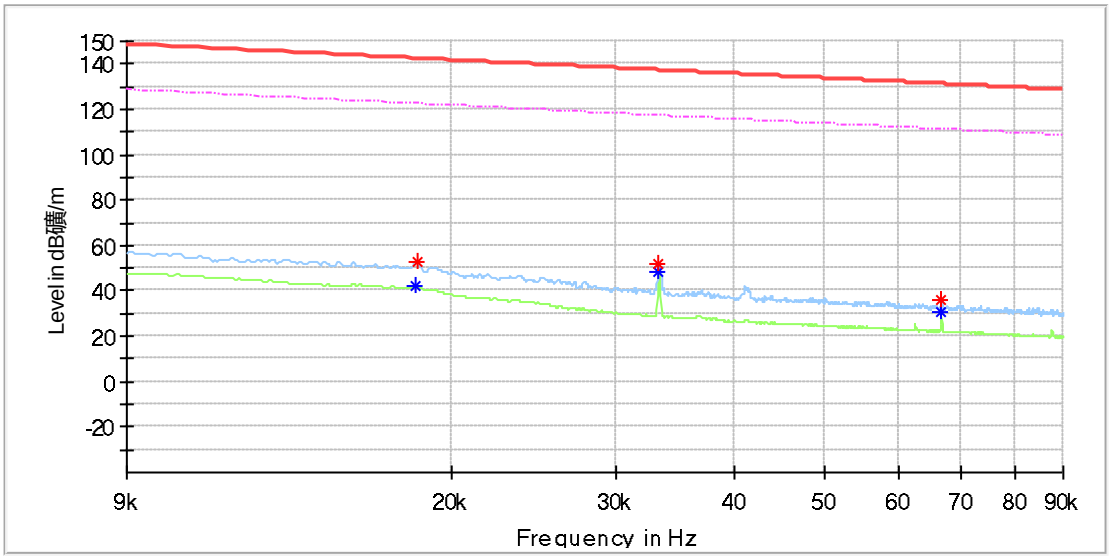


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.018257	52.43	---	142.36	89.93	100.0	V	280.0	20.0
0.018315	---	43.26	122.33	79.07	100.0	V	280.0	20.0
0.089306	39.50	---	128.58	89.08	100.0	V	280.0	20.0
0.089306	---	35.87	108.58	72.71	100.0	V	280.0	20.0

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: Z
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



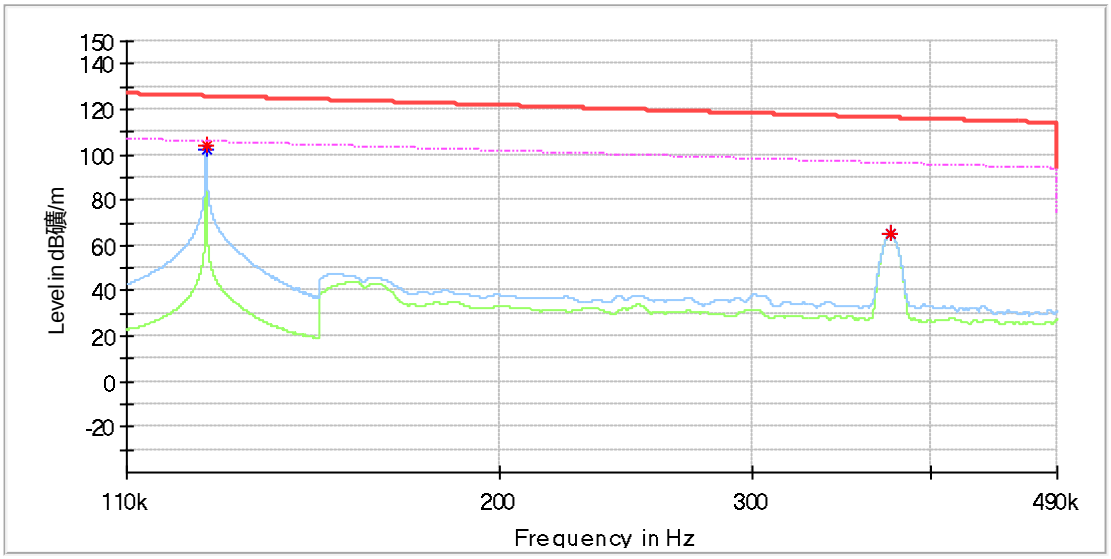
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.018315	---	42.61	122.33	79.72	100.0	V	306.0	20.0
0.018373	52.89	---	142.31	89.42	100.0	V	306.0	20.0
0.033300	51.58	---	137.14	85.56	100.0	V	130.0	20.0
0.033300	---	48.02	117.14	69.12	100.0	V	130.0	20.0
0.066684	36.35	---	131.11	94.77	100.0	V	130.0	20.0
0.066684	---	30.61	111.11	80.50	100.0	V	130.0	20.0

5.1.2.3 110 kHz – 490 kHz

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: X
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

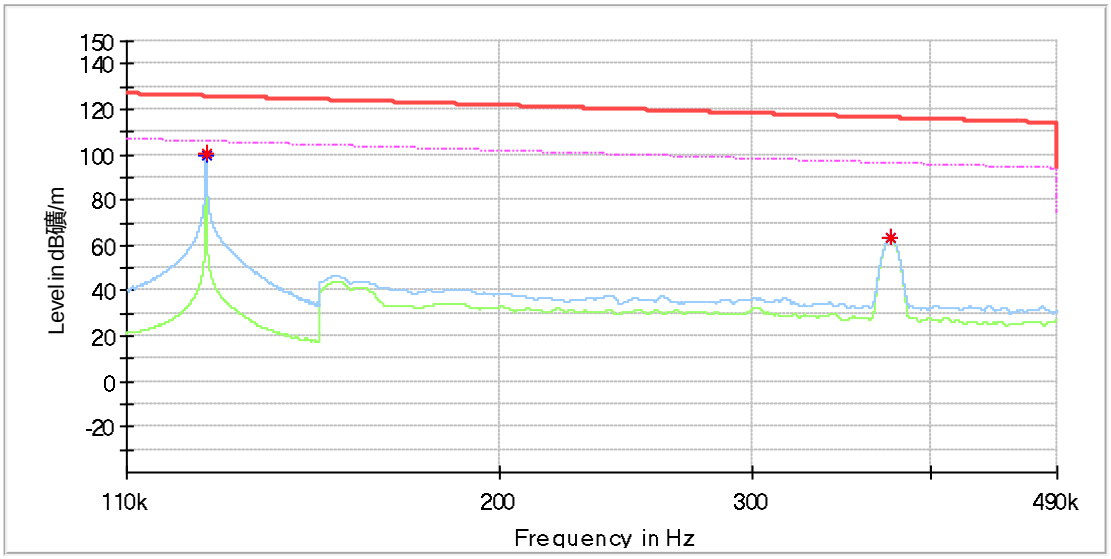


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.124972	104.00	---	125.66	21.66	100.0	V	201.0	20.0
0.125000	---	102.44	105.66	3.22	100.0	V	201.0	20.0
0.374900	---	64.87	96.12	31.25	100.0	V	345.0	20.0
0.374950	64.96	---	116.12	51.16	100.0	V	345.0	20.0

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: Y
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
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)
0.124972	100.86	---	125.66	24.80	100.0	V	256.0	20.0
0.125000	---	99.32	105.66	6.34	100.0	V	256.0	20.0
0.375000	63.19	---	116.12	52.93	100.0	V	263.0	20.0
0.375000	---	63.10	96.12	33.02	100.0	V	263.0	20.0

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: Z
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
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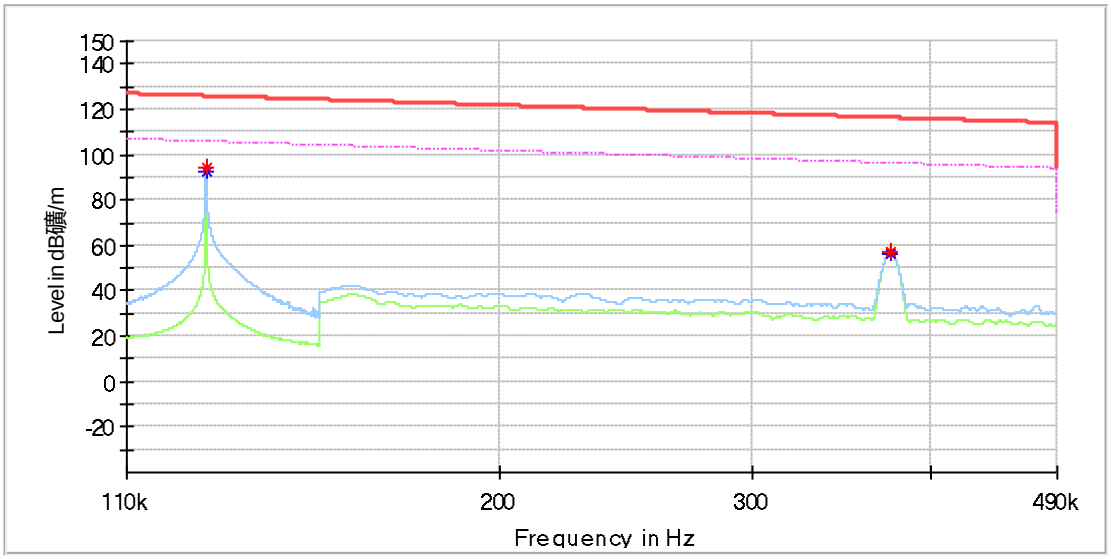


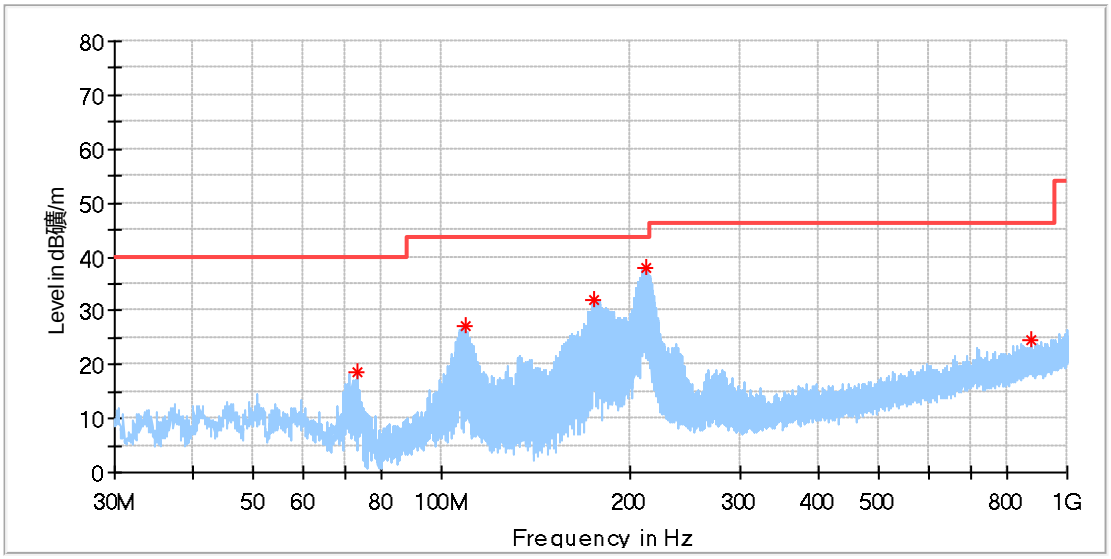
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.124972	94.28	---	125.66	31.38	100.0	V	177.0	20.0
0.124972	---	92.79	105.66	12.87	100.0	V	177.0	20.0
0.375100	56.83	---	116.12	59.29	100.0	V	189.0	20.0
0.375100	---	56.62	96.12	39.50	100.0	V	189.0	20.0

5.1.2.4 30 MHz – 1 GHz

EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: H
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
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)
73.463462	18.62	40.00	21.38	100.0	H	22.0	-23.2
108.980385	27.11	43.50	16.39	100.0	H	217.0	-19.3
174.977692	31.98	43.50	11.52	100.0	H	103.0	-21.3
211.501923	37.82	43.50	5.68	100.0	H	75.0	-19.1
872.780769	24.69	46.00	21.31	100.0	H	6.0	-5.7

Final_Result

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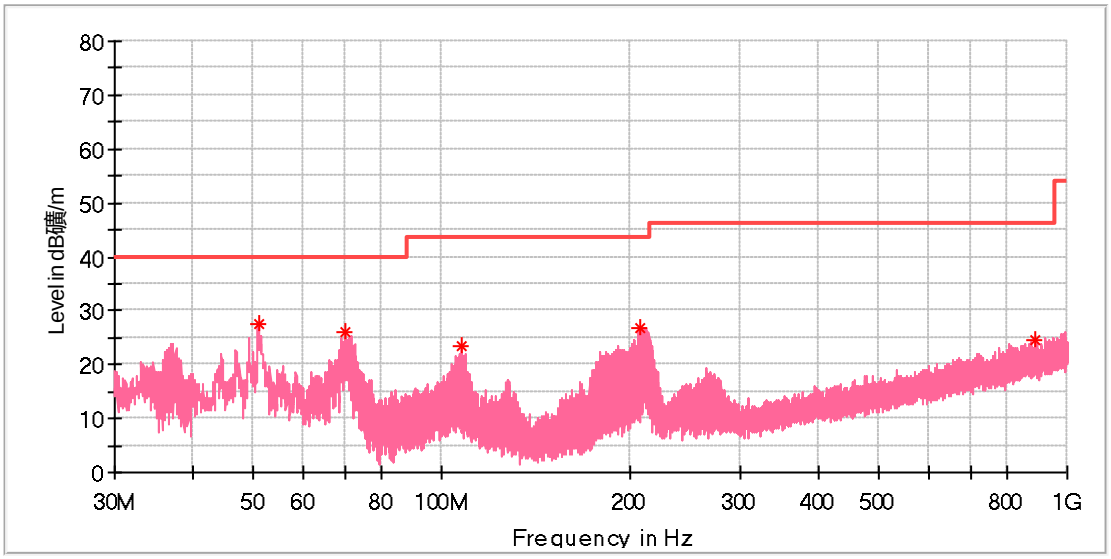
EUT Information

EUT Name:	Body control module
Model:	GEM LV2.1 PEPS
Test Mode:	125kHz, test Antenna orientation: V
Order No/Sample No:	168373325/A003256798-004
Test Voltage::	DC 12V From DC Source
Remark:	Temp 23 Humi:58%
Test Standard:	FCC Part 15C
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)
50.929615	27.49	40.00	12.51	100.0	V	307.0	-18.6
69.993846	26.15	40.00	13.85	100.0	V	121.0	-22.1
107.488077	23.32	43.50	20.18	100.0	V	281.0	-19.2
207.995000	26.78	43.50	16.72	100.0	V	162.0	-19.2
890.016923	24.54	46.00	21.46	100.0	V	289.0	-5.5

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
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6. List of Tables

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