

FCC IC Test Report (Co-location)

Report No.: FCC_IC_RF_ SL20062601-PCE-001_Co-location

Host Model: CEECOACH PLUS

Host FCC ID: 2ANUY-CEECPLUS

Host IC: 23265-CEECPLUS

BT module FCC ID: WAP3027

BT module IC: 7922A-3027

Received Date: 01/19/2021

Test Date: 01/20/2021

Issued Date: 02/02/2021

Applicant: Peiker Consumer Electronics Evolution GmbH

Address: Gartenstraße 25, 61352 Bad Homburg vor der Höhe, Germany

Manufacturer: Peiker Consumer Electronics Evolution GmbH

Address: Gartenstraße 25, 61352 Bad Homburg vor der Höhe, Germany

Issued By: Bureau Veritas Consumer Products Services, Inc.

Lab Address: 775 Montague Expressway, Milpitas, CA 95035

Test Location (1): 775 Montague Expressway, Milpitas, CA 95035

**FCC Registration /
Designation Number:** 540430

ISED# / CAB identifier: 4842D



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Release Control Record


Issue No.	Description	Date Issued
FCC_IC_RF_SL20062601-PCE-001_Co-location	Original Report	02/ 02/ 2021

1 Certificate of Conformity

Product: CEECOACH PLUS
Brand: Peiker
Test Model: CEECOACH PLUS
Series Model: N/A
Sample Status: Engineering sample
Applicant: Peiker Consumer Electronics Evolution GmbH
Test Date: 01/20/2021
Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
RSS-247 Issue 2, February 2017
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :  , Date: 02/02/2021
Gary Chou / Compliance Engineer

Approved by :  , Date: 02/02/2021
Deon Dai / Engineer Reviewer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)/ ISED RSS-247				
FCC Clause	RSS Section(s)	Test Item	Result	Remarks
15.205 & 15.209 & 15.247(d)	RSS-Gen[8.9] RSS-247[5.5]	Radiated Emissions	PASS	Meet the requirement of limit.

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.856 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.638 dB
Radiated Emissions above 1 GHz	Above 1GHz	4.580dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	CEECOACH PLUS
Brand	Peiker
Test Model	CEECOACH PLUS
Status of EUT	Engineering Sample
Power Input	5Vdc
Modulation Type	2.4GHz Short Range: OQPSK BT BDR/EDR: GFSK, $\pi/4$ -DQPSK, 8DPSK BT LE: GFSK
Modulation Technology	2.4GHz Short Range: FHSS BT BDR/ EDR: DTS BT LE: DSSS
Transfer Rate	2.4GHz Short Range: 250 KHz BDR/EDR: up to 3MB/s BT:LE: Up to 1Mbps
Operating Frequency	2.4GHz Short Range:2405~2479MHz BT BDR/ EDR : 2402-2480 MHZ
Antenna Information	2.4GHz Short Range: 2.4 GHz Inverted F Antenna BT BDR/EDR/LE : Chip Antenna, -1dBi
Antenna Connector	BT BDR/EDR/ LE: N/A RFID: N/A

NOTE: The following modules can be chosen to be configured in the EUT.

	Model No.	FCC ID	IC ID
2.4GHz Short Range	CEECOACH PLUS	2ANUY-CEECPLUS CEECPPLUS	23265-CEECPLUS
BT/ BLE	CYBT-353027-02	WAP3027	7922A-3027

3.2 Description of Test Modes

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE<1G	PLC	APCM	
-	√	√	-	-	-

Where **RE \geq 1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

NOTE:

1. The EUT had been pre-tested on the positions of each 3 axis. The worst case was found when positioned on **X-plane**.
2. "-" means no effect.

Radiated Emission Test (Above 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
BDR/ EDR	CH0~CH78	CH 39	DTS	GFSK, $\pi/4$ -DQPSK, 8DPSK
BT LE	CH0~CH39	CH 39	DSSS	GFSK
2.4Ghz Short Range	CH0~CH37	CH0	FHSS	OQPSK

Radiated Emission Test (Below 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
BDR/ EDR	CH0~CH78	CH 39	DTS	GFSK, $\pi/4$ -DQPSK, 8DPSK
BT LE	CH0~CH39	CH 39	DSSS	GFSK
2.4Ghz Short Range	CH0~CH37	CH0	FHSS	OQPSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	25deg. C, 65%RH	5 Vdc	Gary Chou
RE<1G	25deg. C, 65%RH	5 Vdc	Gary Chou

3.3 Description of Support Units

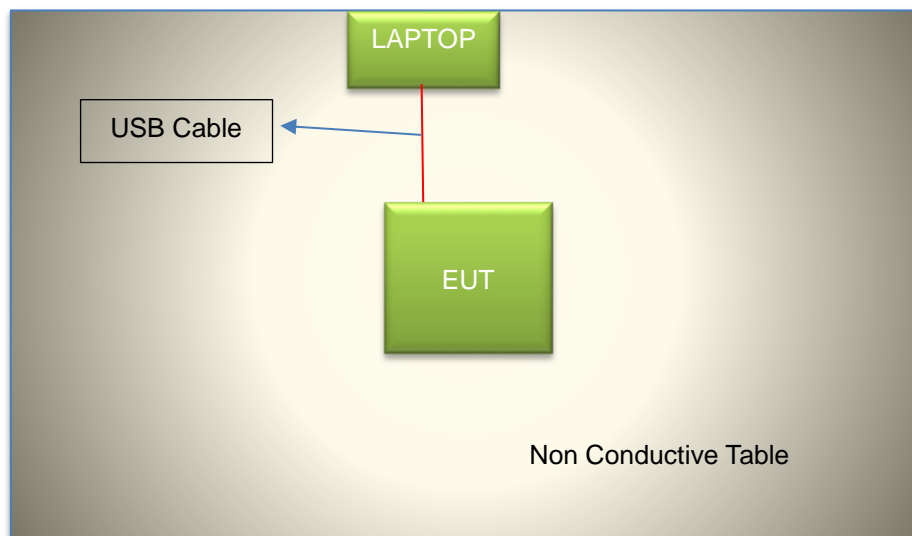
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Dell	Latitude 3550	2MHWY32	N/A	Provided by Lab

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Cable	1	1	No	0	Connect from EUT to Laptop

Note: The core(s) is (are) originally attached to the cable(s).

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 15.247 Meas Guidance v05r02
ISED RSS-247
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer KEYSIGHT	N9030B	MY55330108	07/07/2020	07/07/2021
Horn Antenna ETS-Lindgren	3117	218554	11/22/2020	11/22/2021
Biconilog Antenna Sunol	JB1	A030702	03/09/2020	03/09/2021
Pre-Amplifier RF-Lambda	RAMP00M50GA	17032300048	06/18/2020	06/18/2021

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 3117) are used only for the measurement of emission frequency above 1GHz if tested.

TEST PROCEDURES

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Both Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

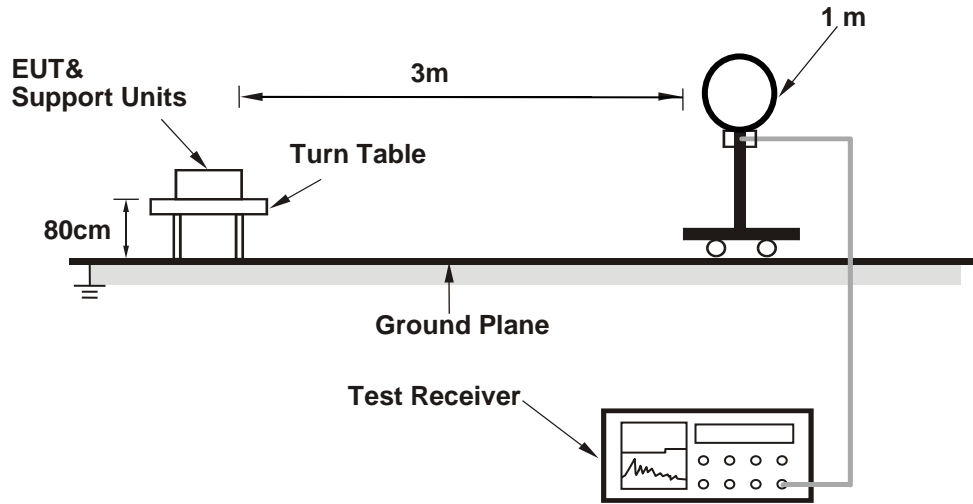
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.3 Deviation from Test Standard

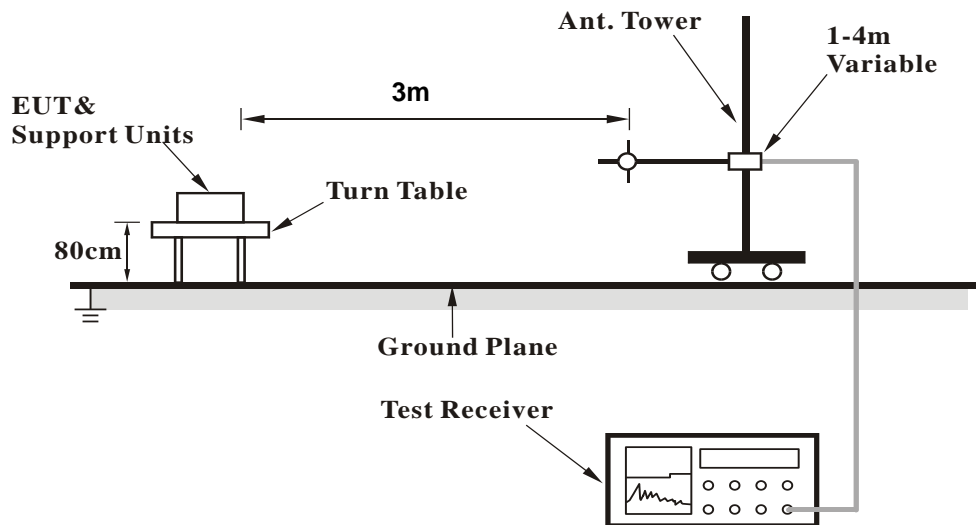
No deviation.

4.1.4 Test Setup

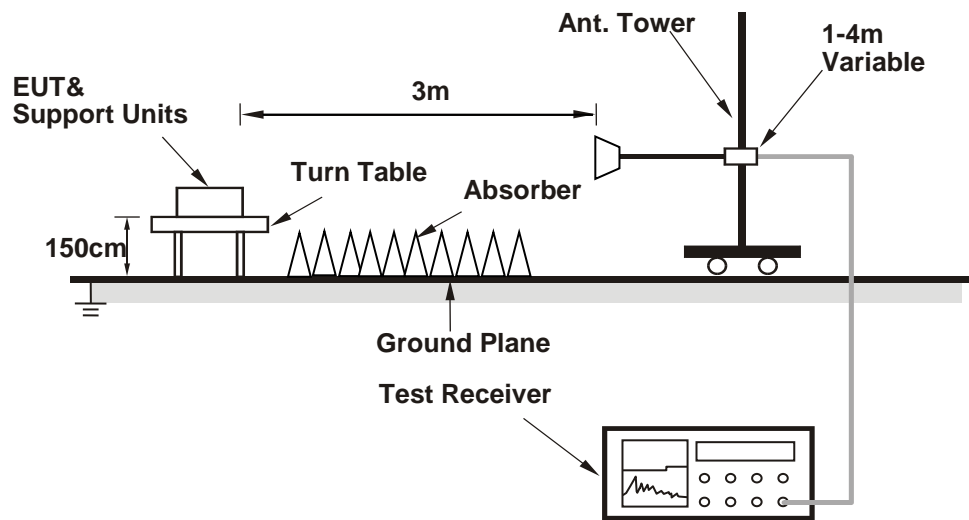
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.5 EUT Operating Conditions

- a. Connected the EUT with the Notebook Computer which is placed on remote site.
- b. Controlling software has been activated to set the EUT on specific status.

4.1.6 Test Results

Above 1GHz Data:

Frequency Range	1-18 GHz		
Input Power	5 Vdc	Environmental Conditions	25 °C, 40% RH
Tested by	Gary Chou	Test Date	01/20/2021
Test Mode	BT BDR/ EDR/LE, 2.4GHz Short Range transmit simultaneously		

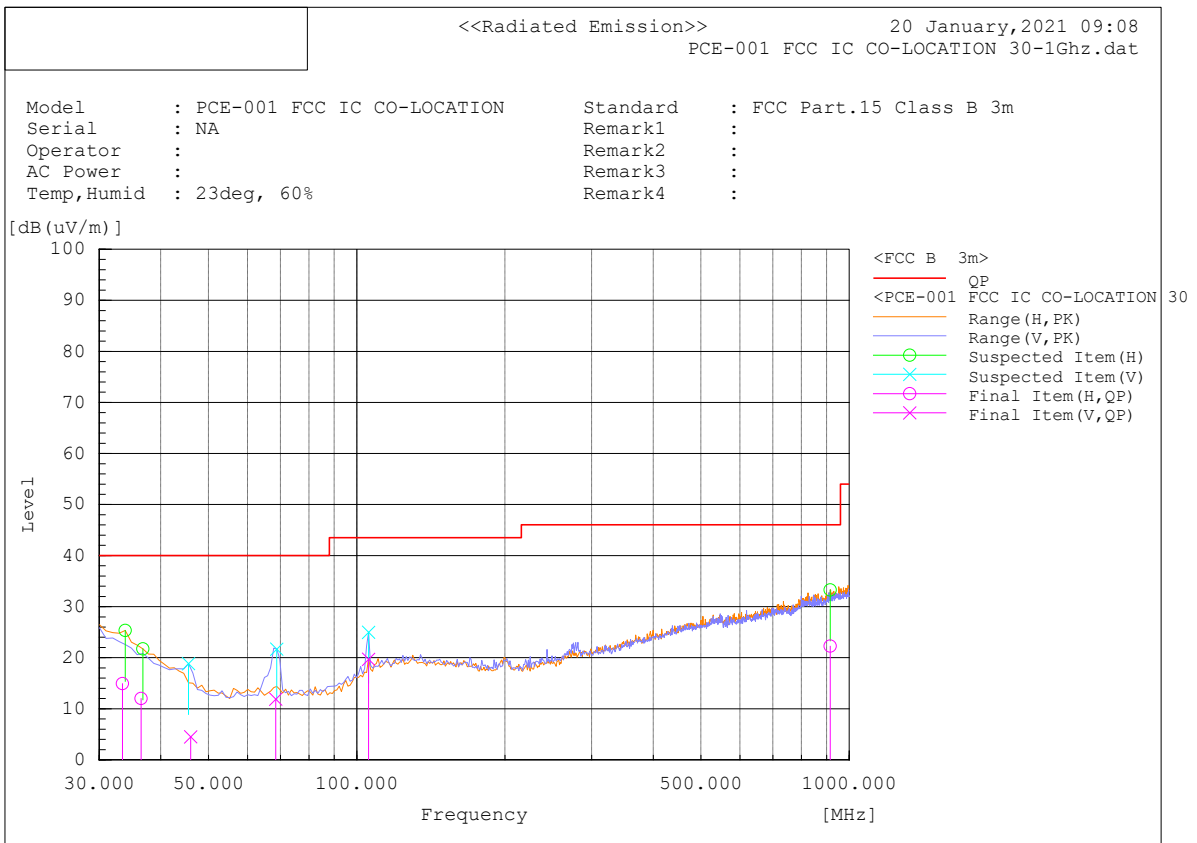
Antenna Polarity & Test Distance: Vertical and Horizontal at 3m													
Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK dB(uV/m)	LimitAV dB(uV/m)	LimitPK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
3384.834	H	56.4	63.3	-8.3	48.1	55	54	74	-5.9	-19	344	0.1	PASS
3810.367	H	39.5	51.4	-7.7	31.8	43.7	54	74	-22.2	-30.3	208	166	PASS
4232.336	H	40.2	50.3	-8.5	31.7	41.8	54	74	-22.3	-32.2	313	18.6	PASS
4656.024	H	39	50.1	-7.6	31.4	42.5	54	74	-22.6	-31.5	344	267.3	PASS
8017.921	H	33.3	45.1	0	33.3	45.1	54	74	-20.7	-28.9	238	337.4	PASS
8440.885	H	31.9	43.9	0	31.9	43.9	54	74	-22.1	-30.1	299	0	PASS

REMARKS:

1. Emission level (dBuV/m) = Reading QP (dBuV) + Factor (dB)
2. Factor (dB) = Antenna Factor (dB) – Cable Loss (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level (dBuV/m) - Limit Value

Below 1GHz Data:

Frequency Range	30MHz -1 GHz		
Input Power	5 Vdc	Environmental Conditions	25 °C, 40% RH
Tested by	Gary Chou	Test Date	01/20/2021
Test Mode	BT BDR/ EDR/LE, 2.4GHz Short Range transmit simultaneously		



Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

Frequency (MHz)	Polarization (H/V)	Reading QP [dB(uV)]	Factor [dB(1/m)]	Level QP [dB(uV/m)]	Limit\QP dB(uV/m)	Margin QP [dB]	Height (cm)	Angle (Deg)	Pass/Fail
33.436	H	-9.5	24.4	14.9	40	-25.1	400	17.2	PASS
36.475	H	-10.2	22.2	12	40	-28	275	78	PASS
45.997	V	-10.2	14.7	4.5	40	-35.5	341	337.5	PASS
68.447	V	-1.2	13.1	11.9	40	-28.1	152	273.2	PASS
105.705	V	1.8	17.9	19.7	43.5	-23.8	100	234	PASS
914.778	H	-8.5	30.8	22.3	46	-23.7	271	69.1	PASS

REMARKS:

1. Emission level (dBuV/m) = Reading QP (dBuV) + Factor (dB)
2. Factor (dB) = Antenna Factor (dB) – Cable Loss (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level (dBuV/m)-Limit Value

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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