

Prüfbericht-Nr.: Test Report No.:	16804256 001	Auftrags-Nr.: Order No.:	1140013772	Seite 1 von 18 Page 1 of 18
Kunden-Referenz-Nr.: Client Reference No.:	412990	Auftragsdatum: Order date:	2014-06-18	
Auftraggeber: Client:	Beijing GODA Instruments Co., LTD. Hongfu Enterprise Incubation Yard 10, No.2 Workshop 2-4, Chang Ping Dist, Beijing 102209 P.R. China			
Prüfgegenstand: Test item:	Pulse Radar Level Instrument			
Bezeichnung / Typ-Nr.: Identification / Type No.:	Refer to section 2.2			
Auftrags-Inhalt: Order content:	FCC certification			
Prüfgrundlage: Test specification:	FCC Part 15 Subpart C Section 15.209			
Wareneingangsdatum: Date of receipt:	2014-10-16	Refer to external photo		
Prüfmuster-Nr.: Test sample No.:	Engineering sample			
Prüfzeitraum: Testing period:	2014-10-16 to 2014-10-21			
Ort der Prüfung: Place of testing:	Refer to section 1.1			
Prüflaboratorium: Testing laboratory:	Refer to section 1.1			
Prüfergebnis*: Test result*:	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
2014-12-09	Wang, Gang/ PE	2014-12-09	Sun, Lixun/Reviewer	
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position
Sonstiges / Other:				
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.				

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Test Report No.

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TEST SUMMARY

4.1.1 RADIATED EMISSION

RESULT: Passed

4.2.1 ELECTROMAGNETIC FIELDS

RESULT: Passed

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1. Test Sites

1.1 Test Facilities

Laboratory 1: TA Beijing Limited (FCC Registration No.: 413514)
Address: Building B-4, No.1, JingHai 3rd Road, BDA East Park, Beijing, 100176 China

Laboratory 2: The State Radio_Monitoring_Center Testing (SRTC) (FCC Registration No.: 910917)
Address: No.98 BeiLishi Road, Xicheng District, Beijing 100037

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Lab 1: (Radiated emission 30MHz-26.5GHz)

Kind of Equipment	Type	S/N	Manufacturer	Calibration Interval	Calibrated until
EMI Receiver	ESIB26	100301	ROHDE & SCHHWARZ	1 year	2015-03-27
Signal Analyzer	FSUP	101355	ROHDE & SCHHWARZ	1 year	2015-01-29
Horn Antenna(18-26.5GHz)	3160-09	00165118	ETS-Lindgren	2 years	2017-03-21
Horn Antenna(1-18GHz)	EMCO 3117	00056662	ETS-Lindgren	2 years	2015-02-15
BiLog Antenna(30M-1GHz)	HL562	100488	R&S	2 years	2015-02-15
DC Power Supply	RS-1303DF	05022506	TFS	1 year	2015-05-24
Laser Beam	Multi-Point Laser	N/A	Boxin	N/A	N/A

Lab 2: (Radiated emission 26.5-40GHz)

Kind of Equipment	Type	S/N	Manufacturer	Calibration Interval	Calibrated until
Spectrum Analyzer	FSQ40	200065	R&S	1 year	2015-03-11
Horn Antenna(26.5-40GHz)	3160-10	808234	ETS	1 year	2015-08-20

1.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology P.R. China) or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

1.4 Calibration

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

1.5 Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO/IEC 17025 are:

Table 2: Measurement Uncertainty

Items		Extended Uncertainty
RE (30-1000MHz)	Field strength (dBuV/m)	$U=\pm 4.94\text{dB}$, $k=2$, $\sigma=95\%$
RE (1-40GHz)	Field strength (dBuV/m)	$U=\pm 4.34\text{dB}$, $k=2$, $\sigma=95\%$

2. General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is Pulse Radar Level Instrument which is based on radar technology and is used to detect the distance between product surface and sensor by means of high frequency electromagnetic waves. The electronic part uses the running time of the signals reflected by the product surface to calculate the distance to the product surface, For more information, please refer to the user manual.

2.2 Ratings and System Details

Table 3: Rating and Technical Specification of EUT

Kind of Equipment:	Pulse Radar Level Instrument
Type Designation:	Refer to table 4
FCC ID	2ACSOGDRD5Y6YD
Rated Input Voltage	DC 24V
Rated consumption power	Less than 1W
Operating Frequency band	6.3GHz
Channel Number	1

Table 4: Type Designation:

Model	GDRD53- (1)(2)(3)(4)(5)(6)(7)(8)(9)
Meaning of wildcard	Option
(1) Explosion Proof Approval	P: Standard I: Intrinsically Safe Exia IIC T6 Ga
(2) Shape of Antenna	K: Horn Φ100mm Stainless Steel/Internal PFA coating L: Horn Φ150mm Stainless Steel/Internal PFA coating
(3) Antenna Extension	A: No B: 200mm C: 500mm D: 1000mm E: 2000mm X: Special Design
(4) Process Connection/Material	FA: Flange DN50 PN1.6/Stainless Steel 316L FB: Flange DN80 PN1.6/Stainless Steel 316L FC: Flange DN100 PN1.6/Stainless Steel 316L FD: Flange DN150 PN1.6/Stainless Steel 316L

	FE: Flange DN200 PN1.6/Stainless Steel 316L YP: Special Design
(5) Electronic	B: (4-20)mA/HART 2-Wire
(6) Housing/Protection	A: Aluminium/IP67 G:Stainless Steel
(7) Cable Entry	M: M20x1.5, N: 1/2NPT
(8) Display/Programming	A: Yes, X:No
(9) Huff	A: Yes, X:No

The products are made up of electronic part, housing part, process connection part, flange accessories part and antenna. All electronic parts including RF circuit are same within these models, and differences of other parts such as Explosion Proof Approval, Process Connection/Material, Flange/Material etc. can not affect RF performance of the product. So tests were carried out according to the description of Table 5: Combination Under Test which considering all worst situation and can cover all combination.

Table 5: Combination Under Test

For all models have same RF circuit, display circuit, power circuit and similar construction, so tests were carried out on samples which were listed below which cover all types of antenna:

Description in the report	Model	Antenna
Sample 1	GDRD53-PKAFCBAMAX	K:Horn Φ100mm Stainless Steel/Internal PFA coating
Sample 2	GDRD53-PLAFDBAMAX	L:Horn Φ150mm Stainless Steel/Internal PFA coating

Table 6: Antenna Information

Antenna Type	Gain(dBi)
K:Horn Φ100mm Stainless Steel/Internal PFA coating	15.1
L:Horn Φ150mm Stainless Steel/Internal PFA coating	18.1

2.3 Independent Operation Modes

The basic operation modes are:

- A. On, transmitting
- B. Off

2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

2.5 Submitted Documents

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

3. Test Set-up and Operation Modes

3.1 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. And the EUT was equipped on the testing tank with normal operating position. Details can be found in the test setup photos.

3.2 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: 2009.

3.3 Special Accessories and Auxiliary Equipment

A cylinder steel tank was used to simulate the actual situation of usage. The tank parameters are as below:

Height: 900mm, radius: 300mm, thickness: 1mm

3.4 Countermeasures to achieve EMC/RF 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.

3.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

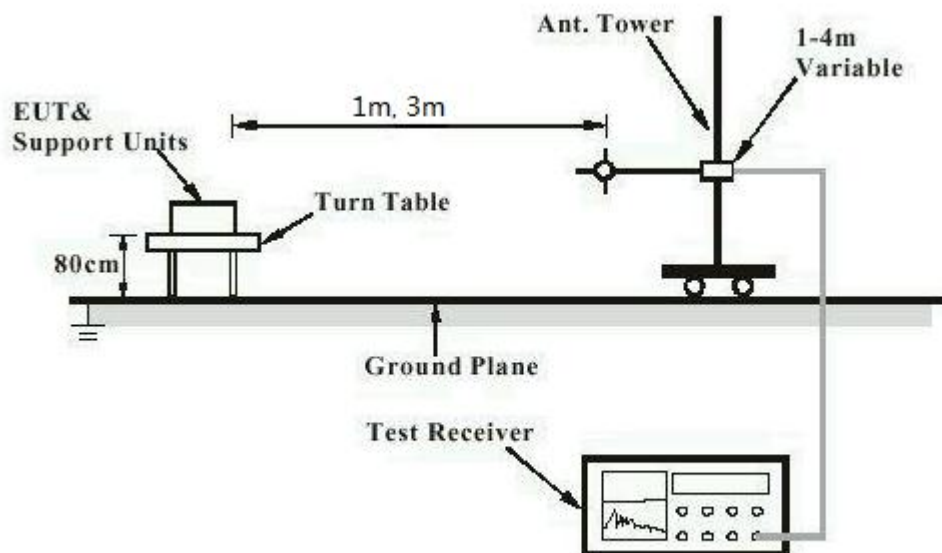
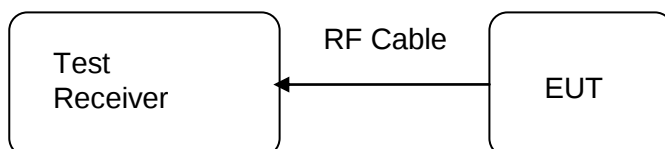


Diagram of Measurement Equipment Configuration for Transmitter Measurement



4. Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Radiated Emission

RESULT:**Passed**

Date of testing	:	2014-10-16&2014-10-21
Test standard	:	FCC part 15.209
Basic standard	:	ANSI C63.10: 2009
Limits	:	Refer to 15.209(a)
Kind of test site	:	3m Semi-Anechoic Chamber($\leq 26.5\text{GHz}$), 5m Full Anechoic Chamber($> 26.5\text{GHz}$)

Test setup

Operation mode	:	A
Ambient temperature	:	25°C
Relative humidity	:	45%
Atmospheric pressure	:	101 kPa
Distance of testing	:	3m(9kHz-26.5GHz), 1m(26.5-40GHz)

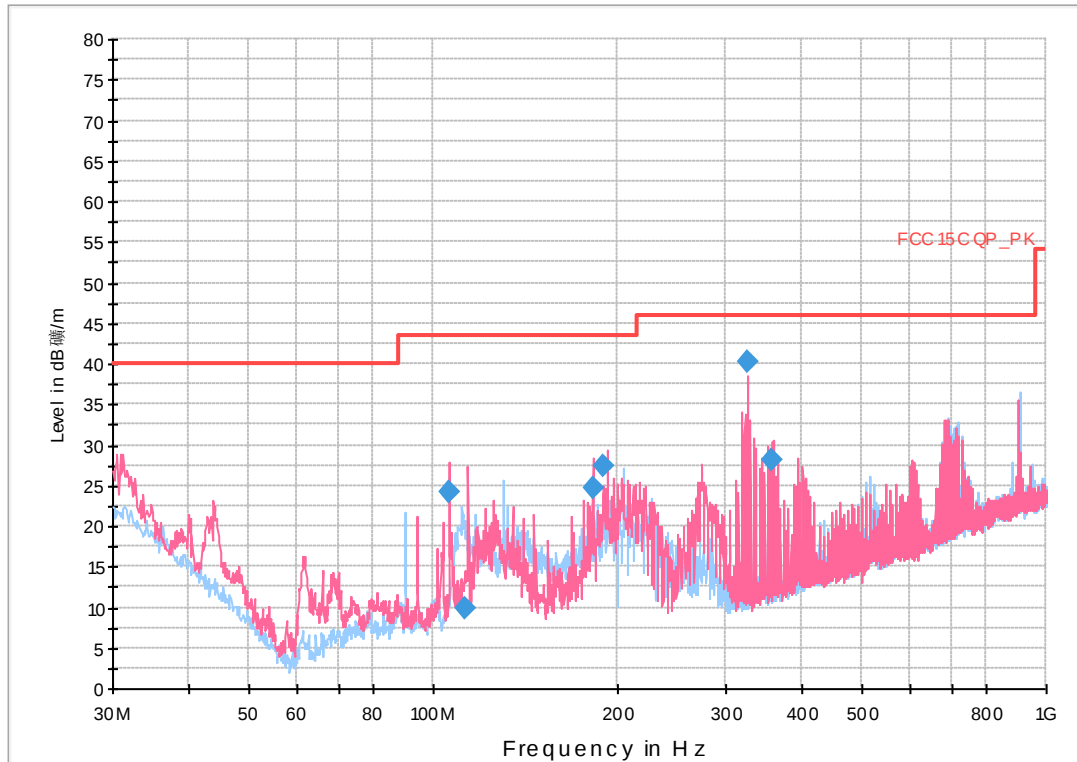
During the test, the EUT was checked in the three orthogonal planes with the receive antenna in both horizontal and vertical polarizations. A resolution bandwidth of 120kHz was used for frequency under 1GHz, and a resolution bandwidth of 1MHz was used for frequency above 1GHz.

A pre-test was performed on all of the samples listed in the table 5, no radiated harmonics or unintentional emission was found below 30MHz and above 1GHz. The following plots are provided as reference. The 26.5-40GHz plots were taken with the measure antenna close to the transmit antenna at 1m distance to reduce the impact of background noise, and the limit at 1m converted from 3m limit for 26.5-40GHz is 63.54dBuV/m(Average limit) and 83.54dBuV/m(Peak limit).

9 kHz - 30 MHz emission result was far below limit, hence not presented in this test report.

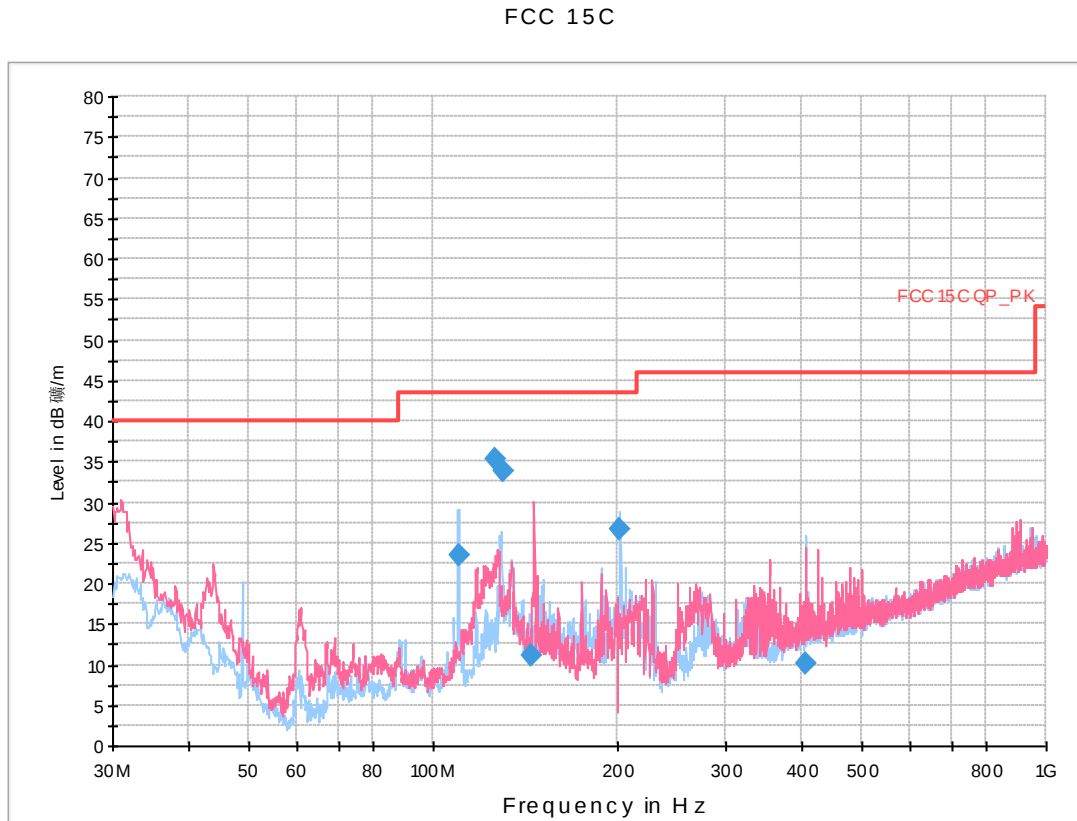
Emission below 1GHz
Figure 1: Radiated emission measurement results, GDRD53-PKAFCBAMAX

FCC 15C


Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
105.992024	24.3	15000.0	120.000	100.0	V	267.0	-26.7	19.20
112.517655	9.9	15000.0	120.000	150.0	V	131.0	-26.3	33.60
182.003928	24.7	15000.0	120.000	100.0	V	250.0	-26.1	18.80
189.983968	27.4	15000.0	120.000	185.0	V	22.0	-26.2	16.10
325.781303	40.2	15000.0	120.000	119.0	V	8.0	-21.8	5.80
358.006233	28.0	15000.0	120.000	141.0	V	4.0	-21.3	18.00

Figure 2: Radiated emission measurement results, GDRD53-PLAFDBAMAX

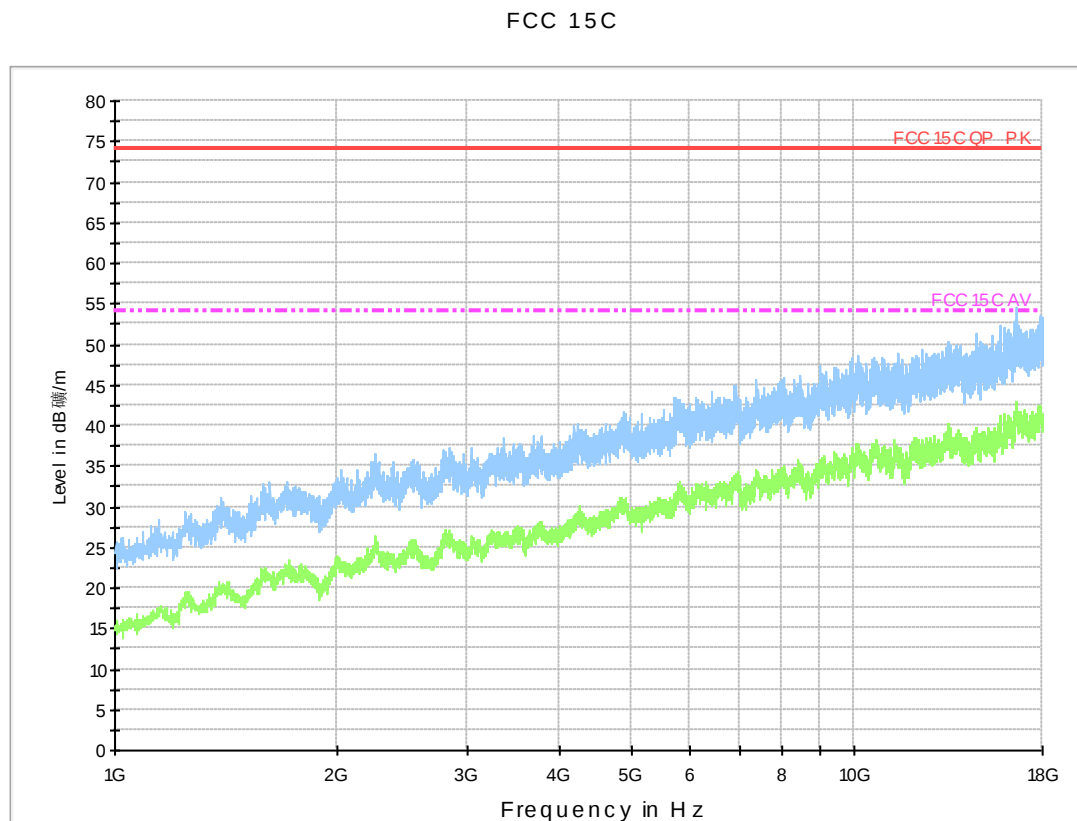


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
110.009639	23.5	15000.0	120.000	150.0	H	285.0	-26.5	20.00
126.000902	35.4	15000.0	120.000	100.0	V	199.0	-25.9	8.10
130.047315	33.7	15000.0	120.000	177.0	H	243.0	-26.3	9.80
144.341784	11.1	15000.0	120.000	119.0	V	170.0	-27.2	32.40
202.023607	26.7	15000.0	120.000	169.0	H	229.0	-26.3	16.80
405.000822	10.2	15000.0	120.000	229.0	V	101.0	-19.7	35.80

Emission above 1GHz

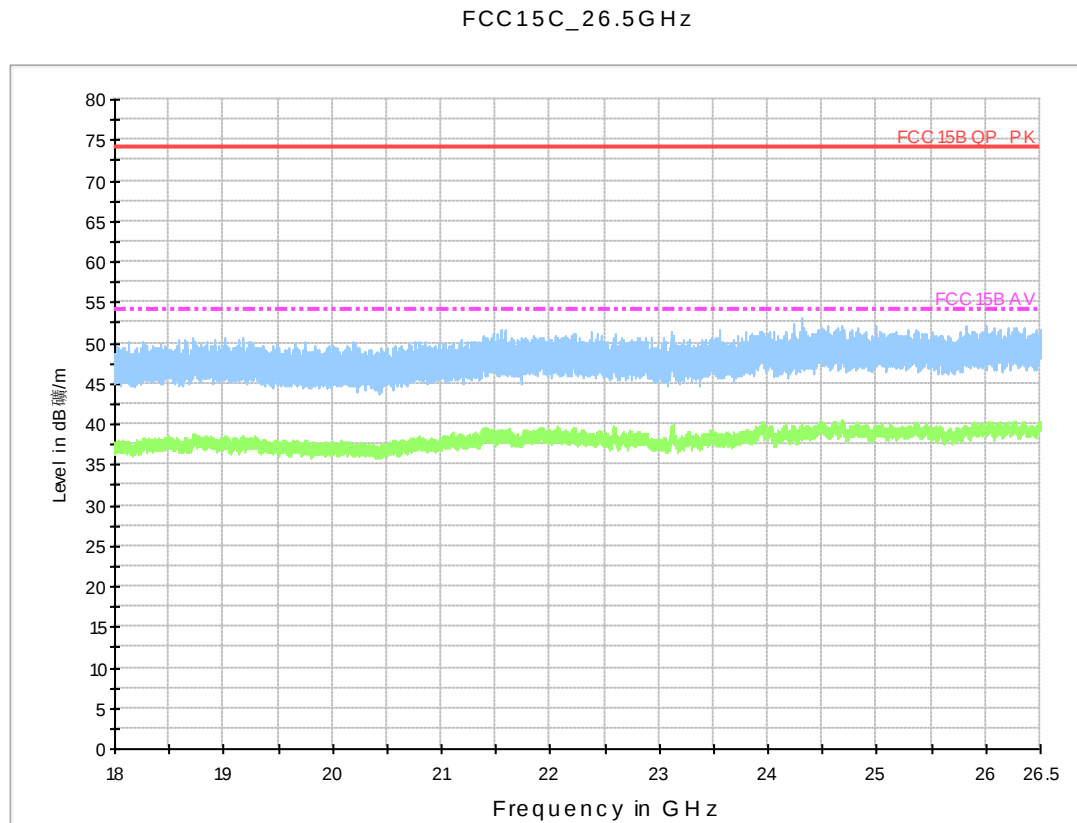
Figure 3: Radiated emission measurement results, 1GHz-18GHz, worst data(Sample 1)



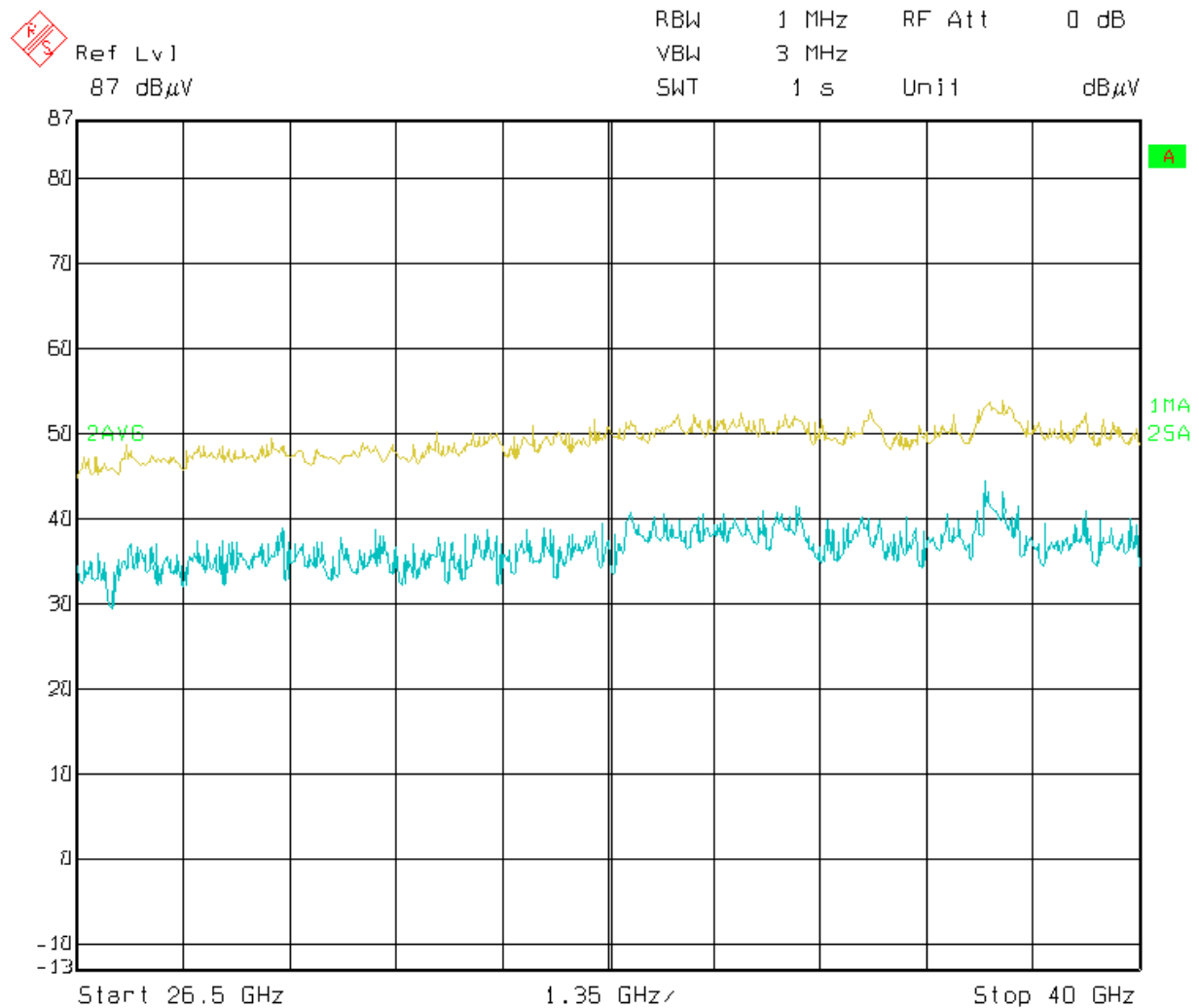
Final measurement result:

No emission was found above the background noise.

Figure 4: Radiated emission measurement results, 18GHz-26.5GHz, worst data(Sample 1)



Final measurement result:
No emission was found above the background noise.

Figure 5: Radiated emission measurement results, 26.5GHz-40GHz, worst data(Sample 1)


Final measurement result:
 No emission was found above the background noise.

4.2 Radio Frequency Exposure Compliance

4.2.1 Electromagnetic Fields

RESULT:

Passed

Date of testing : 2014-10-16
Test standard : FCC KDB Publication 447498 D01 General RF Exposure
Guidance v05r02
FCC 1.1310

MPE Calculation
According to the formula

$$Pd = \frac{P_{out} * G}{4\pi R^2}$$

Where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = Antenna gain in numeric

π = 3.14159

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

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping the safety distance from the antenna should be included in the user manual.

The highest measured power including antenna gain is -15.31dBm(0.0294mW), hence the Maximum Permissible Exposure (MPE) value:

$$Pd = \frac{P_{out} * G}{4\pi R^2} = \frac{0.0294 \times 1}{4 \times 3.14159 \times 20^2} = 5.849 \times 10^{-6} \text{ mW / cm}^2 < 1 \text{ mW / cm}^2$$

Therefore the device is exclusion from SAR test, and compliance with MPE limit.

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