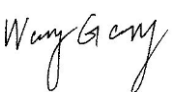


Prüfbericht-Nr.: Test Report No.:	16804174 001	Auftrags-Nr.: Order No.:	1140013772	Seite 1 von 24 Page 1 of 24
Kunden-Referenz-Nr.: Client Reference No.:	412990	Auftragsdatum: Order date:	2014-06-18	
Auftraggeber: Client:	Beijing GODA Instruments Co., LTD. Hongfu Enterprise Incubation Yard 10, No.2 Workshop 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:	2014-06-18	Refer to external photo		
Prüfmuster-Nr.: Test sample No.:	Engineering sample			
Prüfzeitraum: Testing period:	2014-08-11 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:		
2014-11-05	Wang, Gang/ PE		2014-11-05	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. <i>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.</i>				

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

Lab 2: (Radiated emission 26.5-110GHz)

Kind of Equipment	Type	S/N	Manufacturer	Calibrated until
Spectrum Analyzer	FSQ40	200065	R&S	2015-03-11
Harmonic Mixer(40-60GHz)	FS-Z60	100053	R&S	2015-03-11
Harmonic Mixer(60-90GHz)	FS-Z90	100021	R&S	2015-03-11
Harmonic Mixer(75-110GHz)	FS-Z110	100019	R&S	2015-03-11
Horn Antenna(18-26.5GHz)	3160-09	760840	ETS	2015-08-20

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Kind of Equipment	Type	S/N	Manufacturer	Calibrated until
Horn Antenna(26.5-40GHz)	3160-10	808234	ETS	2015-08-20
Horn Antenna(40-60GHz)	24240-20	103	FLANN	2015-03-11
Horn Antenna(60-90GHz)	26240-20	110	FLANN	2015-03-11
Horn Antenna(75-110GHz)	27240-20	112	FLANN	2015-03-11

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 (1-110GHz)	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	2ACSOGDRD5Y6YA
Rated Input Voltage	DC 24V
Rated consumption power	Less than 1W
Operating Frequency band	25.4GHz
Channel Number	1

Table 4: Type Designation:

Model	GDRD55-(1)(2)(3)(4)(5)(6)(7)(8)
Meaning of wildcard	Option
(1) Explosion Proof Approval	P: Standard I: Intrinsically Safe Exia IIC T6 Ga
(2) Shape of Antenna	B: (R) Airproof Horn $\Phi 44/L86$ N: (R) Airproof Horn $\Phi 44/L108$
(3) Process Connection	GP: (F) Thread $G1\frac{1}{2}A$ NP: (F) Thread $1\frac{1}{2}NPT$
(4) Length of Vessel Socket	A: NO
(5) Electronic	B: (4-20)mA/HART 2-Wire
(6) Housing/Protection	A: Aluminium/IP67
(7) Cable Entry	M: M20x1.5, N: 1/2NPT
(8) Display/Programming	A: Yes, X: No

Model	GDRD56-(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	B: (T)Horn Φ 48mm/L140
(3) Process Connection/Material	GP: (H)thread $G1\frac{1}{2}$ A/Stainless Steel 316L GA: (H)thread $1\frac{1}{2}$ NPT/Stainless Steel 316L GB: (G)thread $G1\frac{1}{2}$ PP GC: (J)thread $G1\frac{1}{2}$ A/Stainless Steel 316L/temperature(-60~250)°C GE: (I)thread $G1\frac{1}{2}$ A/Stainless Steel 316L(Huff)
(4) Flange/Material	FA:DN50/PP, GA:DN80/PP,HA:DN100/PP, IA:DN125/PP, FB:DN50/PTFE, GB:DN80/PTFE, HB:DN100/PTFE, IB:DN125/PTFE FC:DN50/Stainless Steel, GC:DN80/Stainless Steel, HC:DN100/Stainless Steel, IC:DN125/Stainless Steel MA:ANSI 3"/Stainless Steel MB: ANSI 4"/Stainless Steel MC:ANSI 6"/Stainless Steel NA:ANSI 3"/PTFE NB: ANSI 4"/PTFE NC:ANSI 6"/PTFE F0:NO
(5) Seal/Process Temperature	2: Viton(-60~150) °C 3: Kalrez(-60~250) °C 4: Graphite(-60~400) °C
(6) Electronic	B: (4-20)mA/HART 2-Wire
(7) Housing/Protection	A: Aluminium/IP67
(8) Cable Entry	M: M20x1.5, N: 1/2NPT
(9) Display/Programming	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	GDRD56-PBGPFO2BAMA	(T)Horn Φ 48mm/L140
Sample 2	GDRD55-PBGPABAMA	(R)Airproof Horn Φ 44mm/L86
Sample 3	GDRD55-PNGPABAMA	(R)Airproof Horn Φ 44mm/L108

Table 6: Antenna Information

Antenna Type	Gain(dBi)	Beam angle
(T)Horn Φ 48mm/L140	19.2	18°
(R)Airproof Horn Φ 44mm/L86	18.3	22°
(R) Airproof Horn Φ 44mm/L108	18.5	22°

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

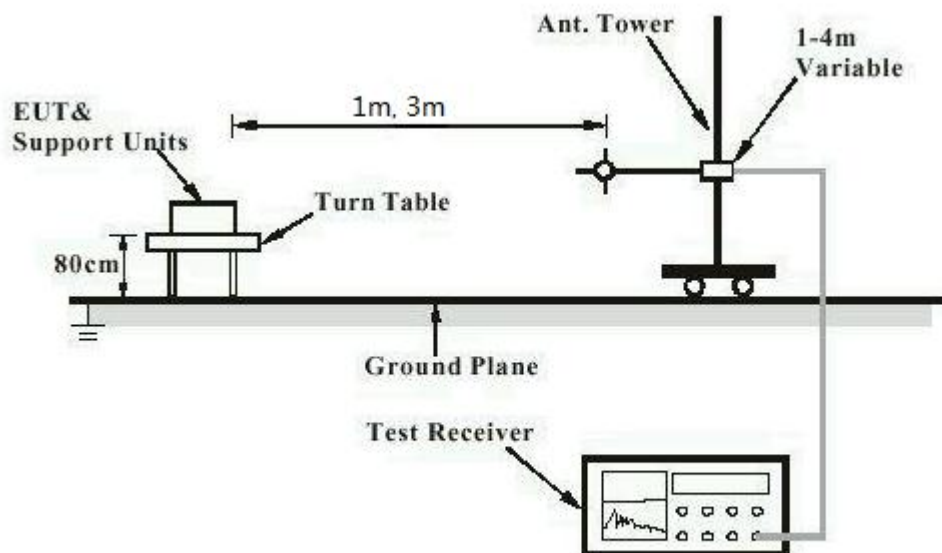
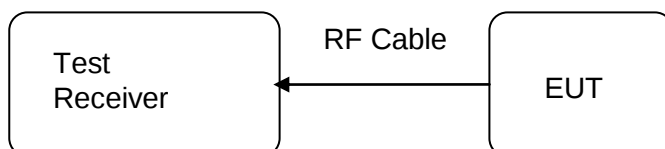


Diagram of Measurement Equipment Configuration for Transmitter Measurement



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(26.5-110GHz)

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.

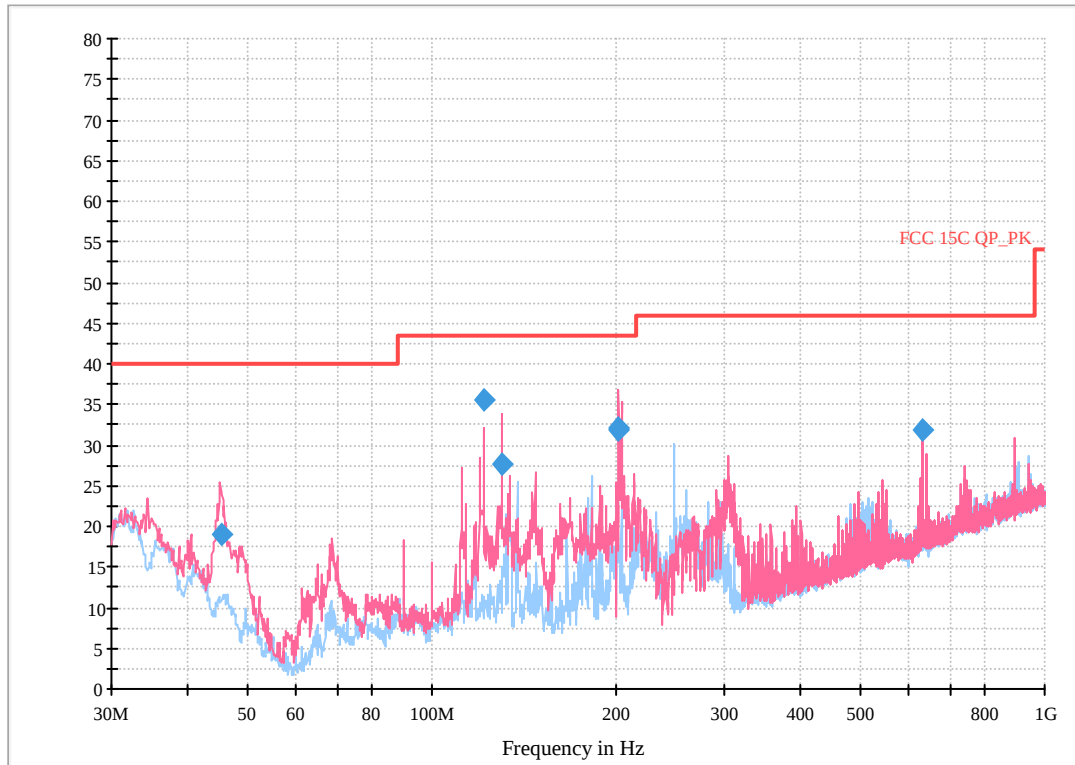
A pre-test was performed on all of the samples listed in the table 5, no radiated harmonics or unintentional emission was found below 30MHz and above 1GHz. The following plots are provided as reference. The 26.5-110GHz plots were taken with the measure antenna close to the transmit antenna at 1m distance to reduce the impact of background noise, and the limit at 1m converted from 3m limit for 26.5-110GHz 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.

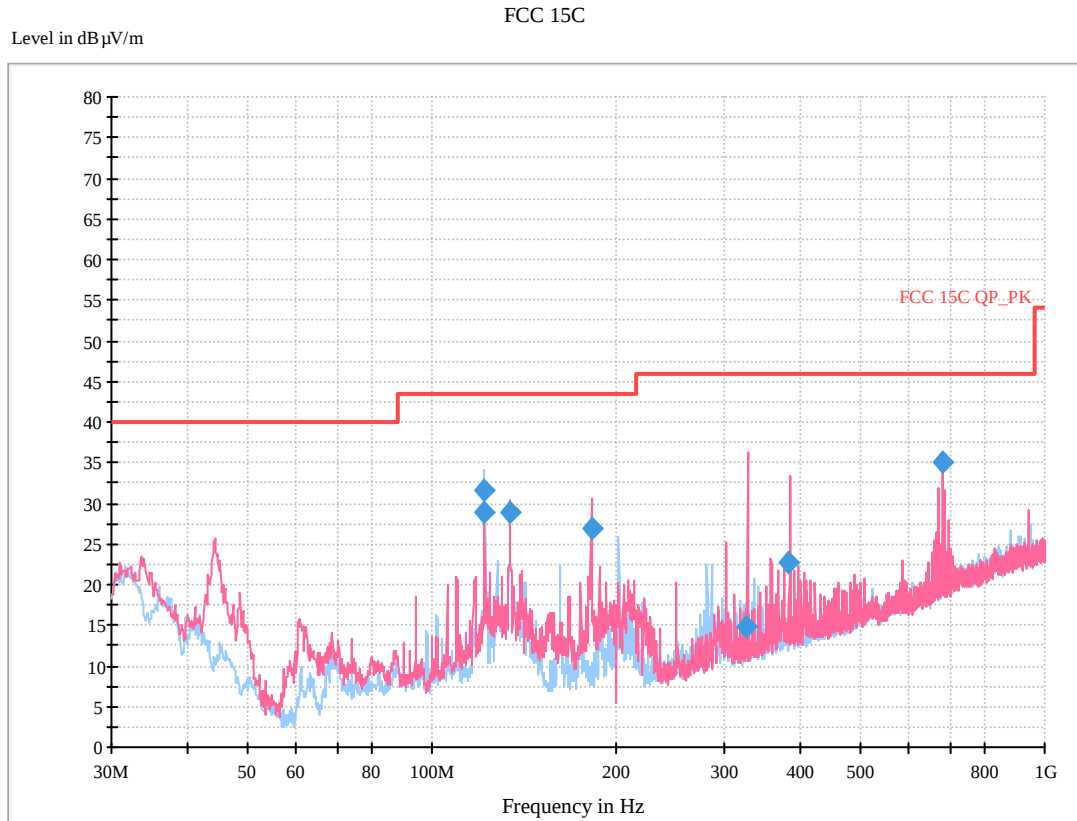
Emission below 1GHz
Figure 1: Radiated emission measurement results, GDRD55-PBGPABAMA

Level in dB μ V/m

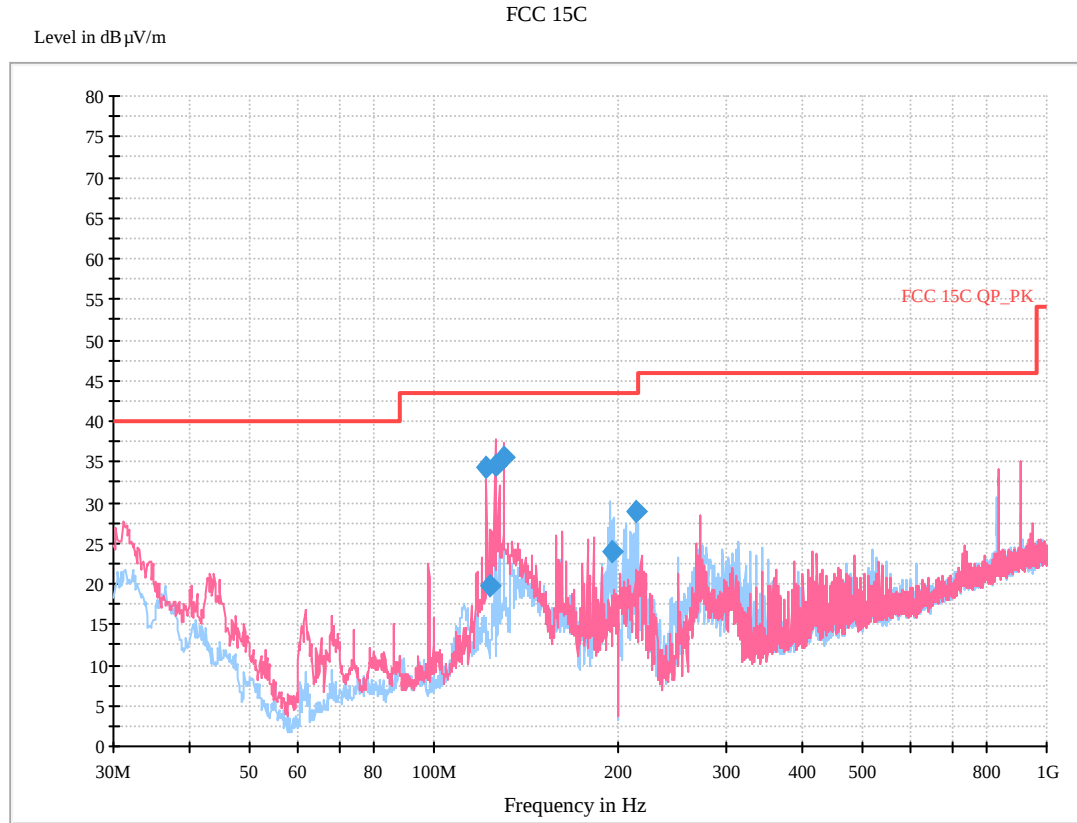
FCC 15C



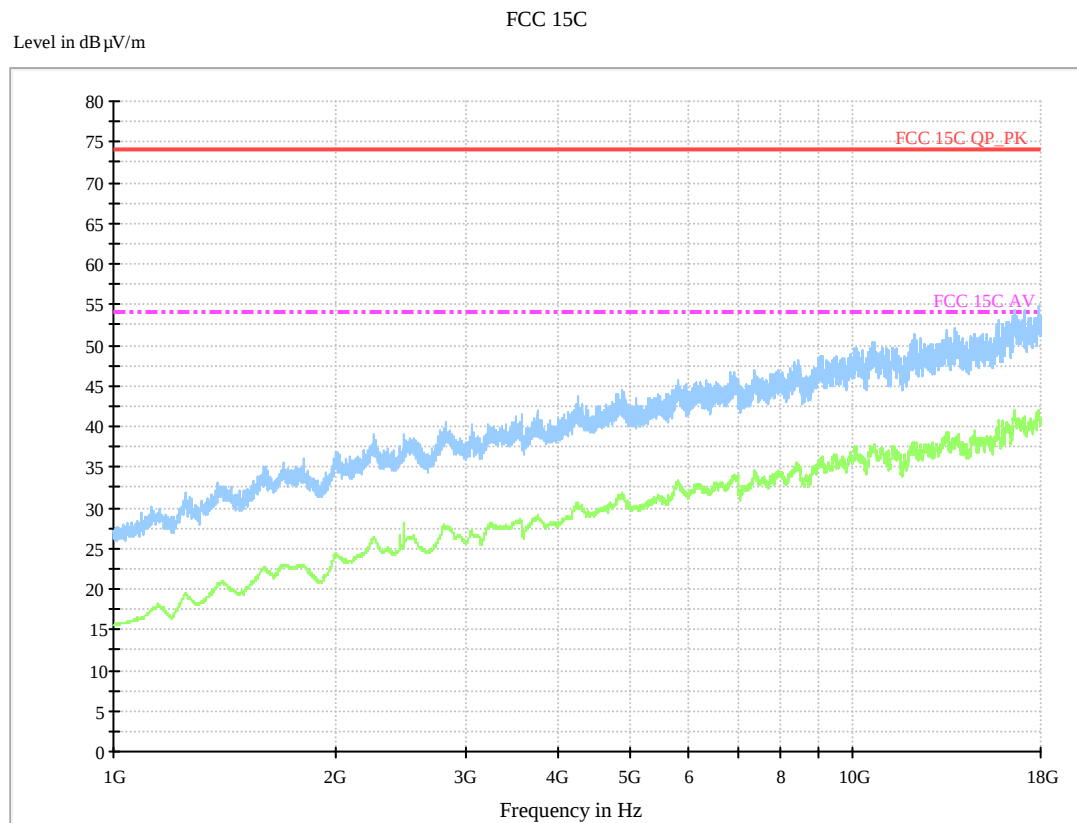
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
45.370301	19.1	15000.0	120.000	100.0	V	131.0	-26.0	20.90
122.033687	35.5	15000.0	120.000	100.0	V	49.0	-25.5	8.00
129.959720	27.6	15000.0	120.000	100.0	V	184.0	-26.3	15.90
202.038016	32.1	15000.0	120.000	100.0	V	36.0	-26.3	11.40
202.053607	31.9	15000.0	120.000	100.0	V	1.0	-26.3	11.60
633.677335	31.9	15000.0	120.000	119.0	V	63.0	-14.9	14.10

Figure 2: Radiated emission measurement results, GDRD55-PNGPABAMA


Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
121.943687	29.0	15000.0	120.000	150.0	H	45.0	-25.5	14.50
121.994088	31.7	15000.0	120.000	150.0	H	45.0	-25.5	11.80
134.018136	28.8	15000.0	120.000	150.0	V	45.0	-26.6	14.70
181.994329	26.9	15000.0	120.000	100.0	V	15.0	-26.1	16.60
326.574509	14.8	15000.0	120.000	238.0	V	187.0	-21.9	31.20
383.068337	22.8	15000.0	120.000	201.0	V	215.0	-20.2	23.20
680.190721	35.0	15000.0	120.000	119.0	V	218.0	-13.8	11.00

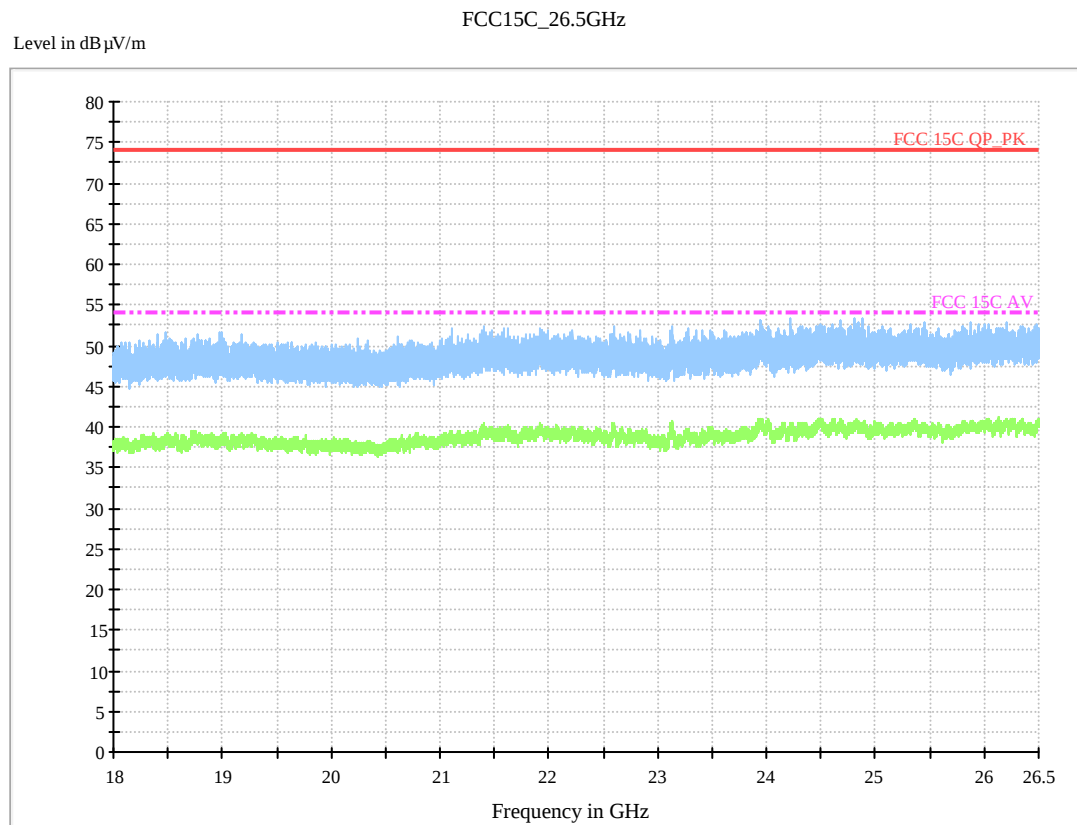
Figure 3: Radiated emission measurement results, GDRD56-PBGPFO2BAMA


Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
121.994088	34.3	15000.0	120.000	150.0	V	236.0	-25.5	9.20
123.443687	19.8	15000.0	120.000	150.0	V	226.0	-25.5	23.70
125.942104	34.7	15000.0	120.000	100.0	V	226.0	-25.9	8.80
130.040120	35.6	15000.0	120.000	100.0	V	225.0	-26.3	7.90
195.998377	23.9	15000.0	120.000	150.0	H	46.0	-26.6	19.60
213.978056	28.8	15000.0	120.000	150.0	H	80.0	-26.2	14.70

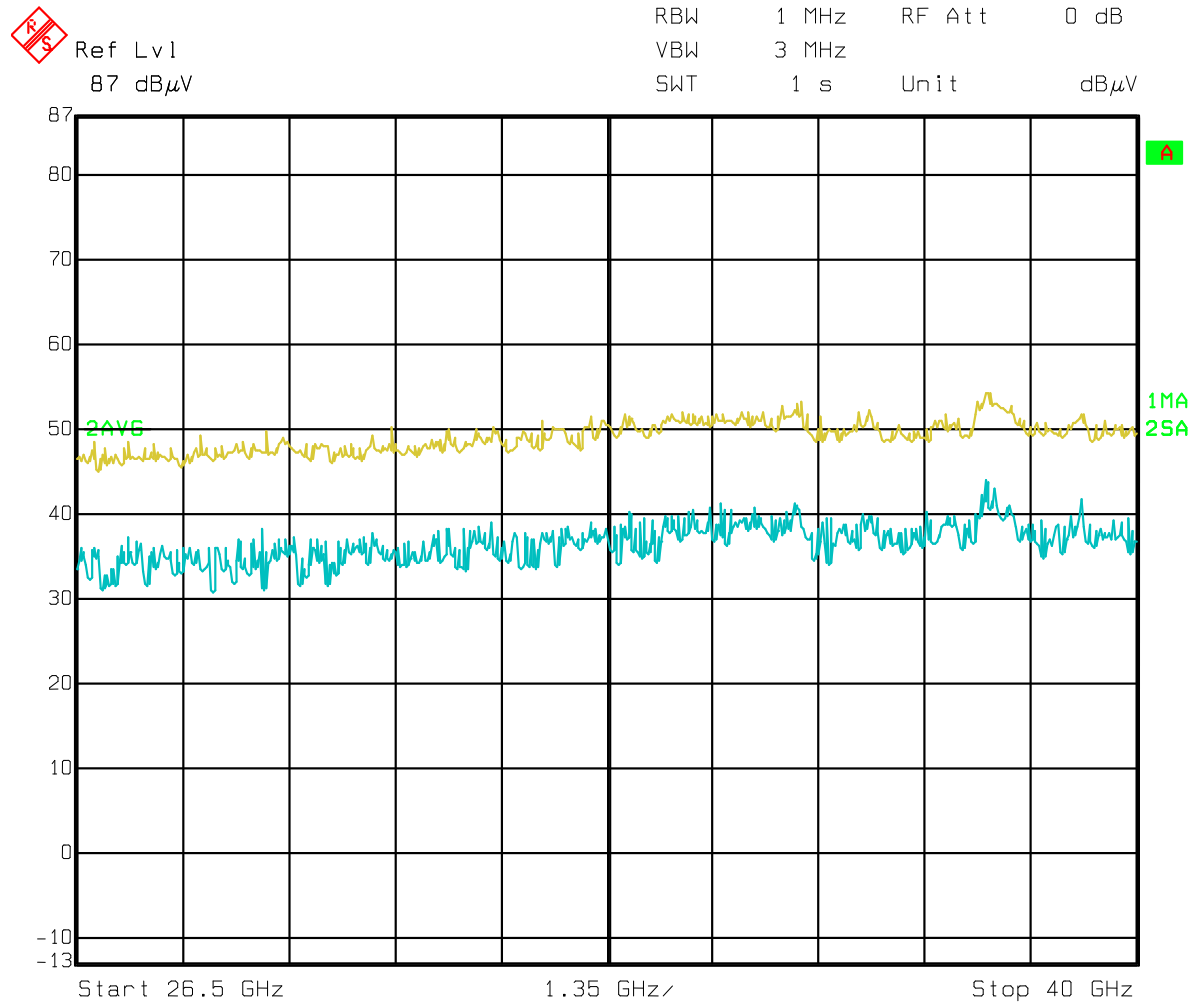
Emission above 1GHz
Figure 4: Radiated emission measurement results, 1GHz-18GHz, worst data


Final measurement result:

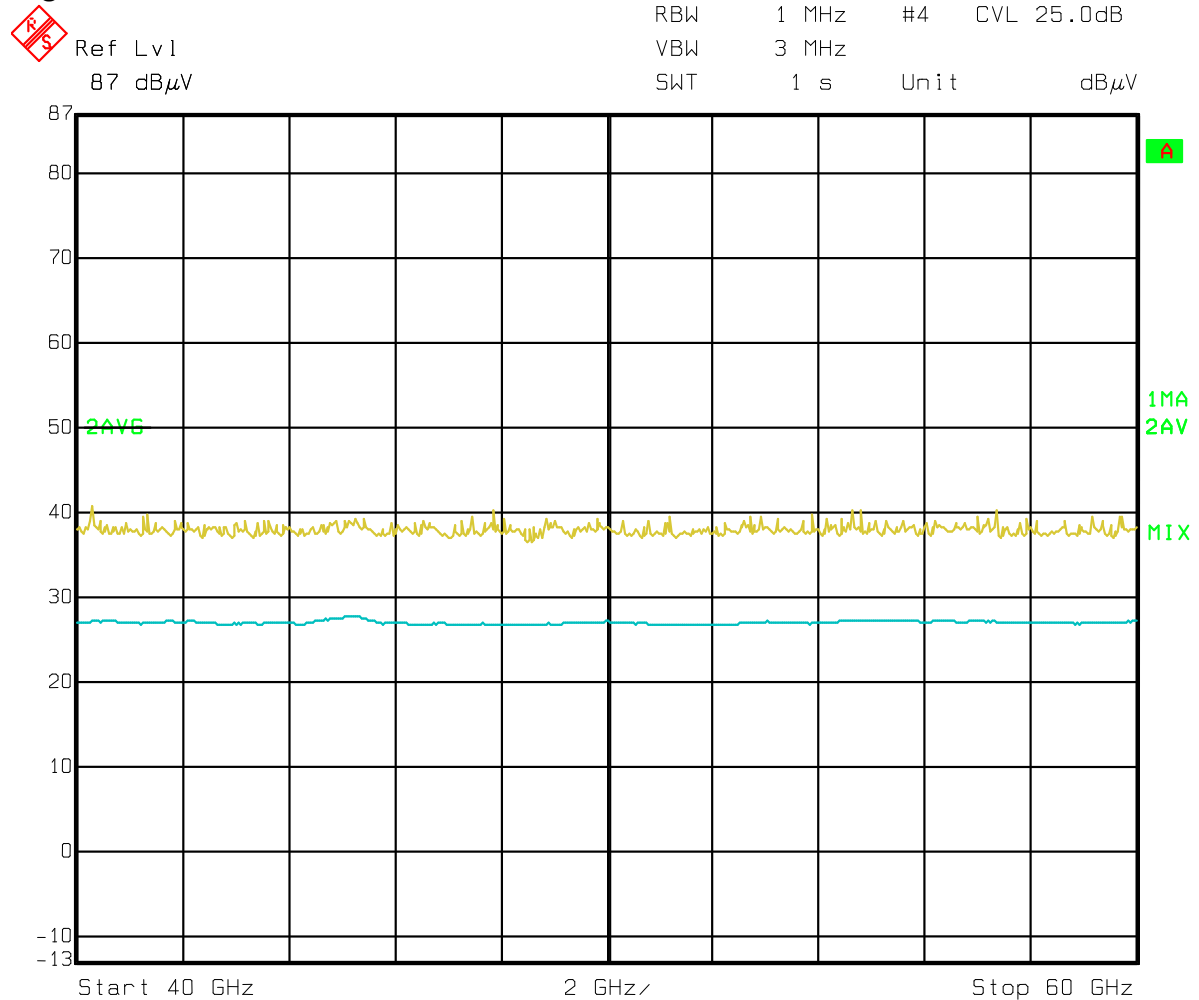
No emission was found above the background noise.

Figure 5: Radiated emission measurement results, 18GHz-26.5GHz, worst data

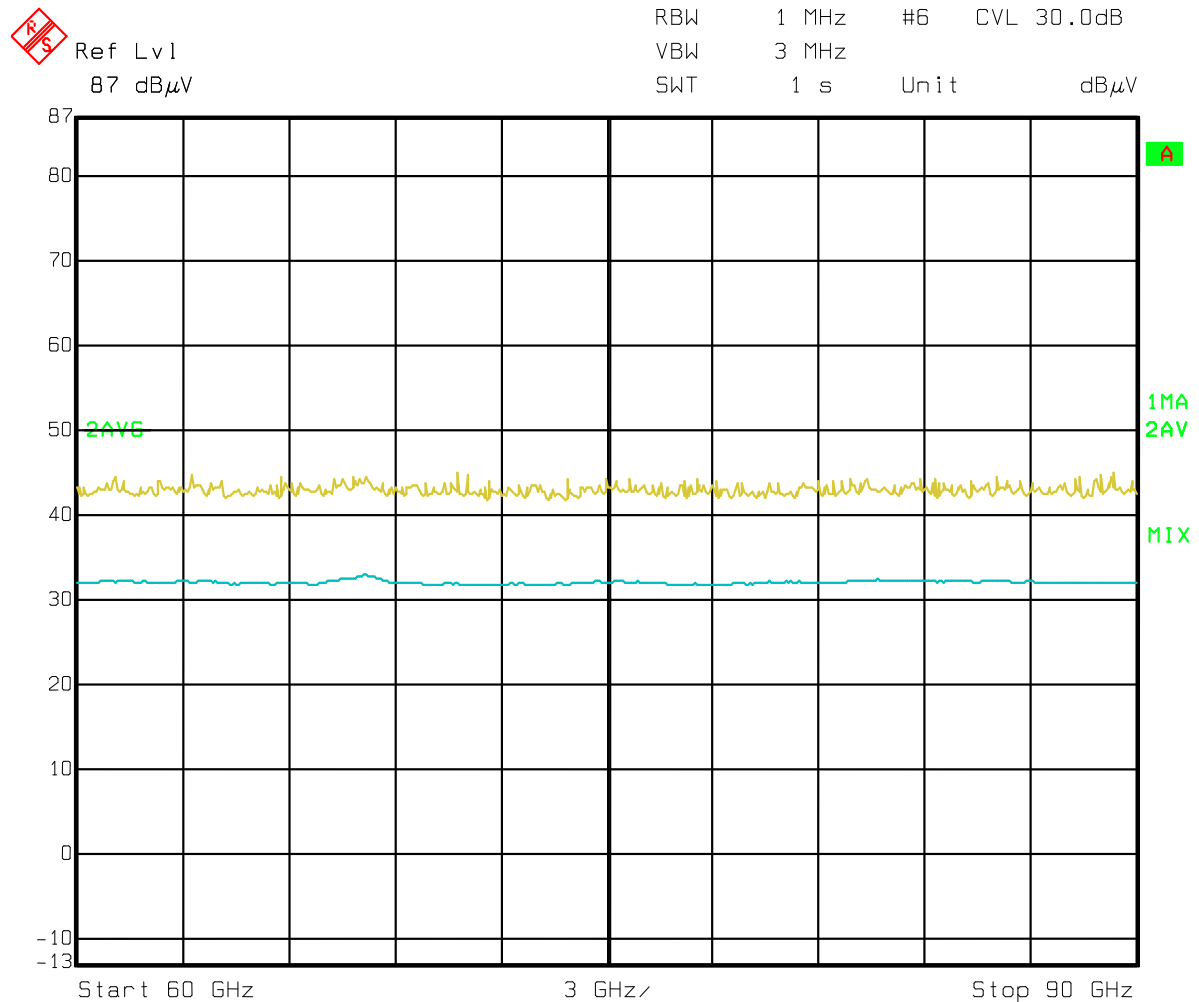
Final measurement result:
No emission was found above the background noise.

Figure 6: Radiated emission measurement results, 26.5GHz-40GHz, worst data


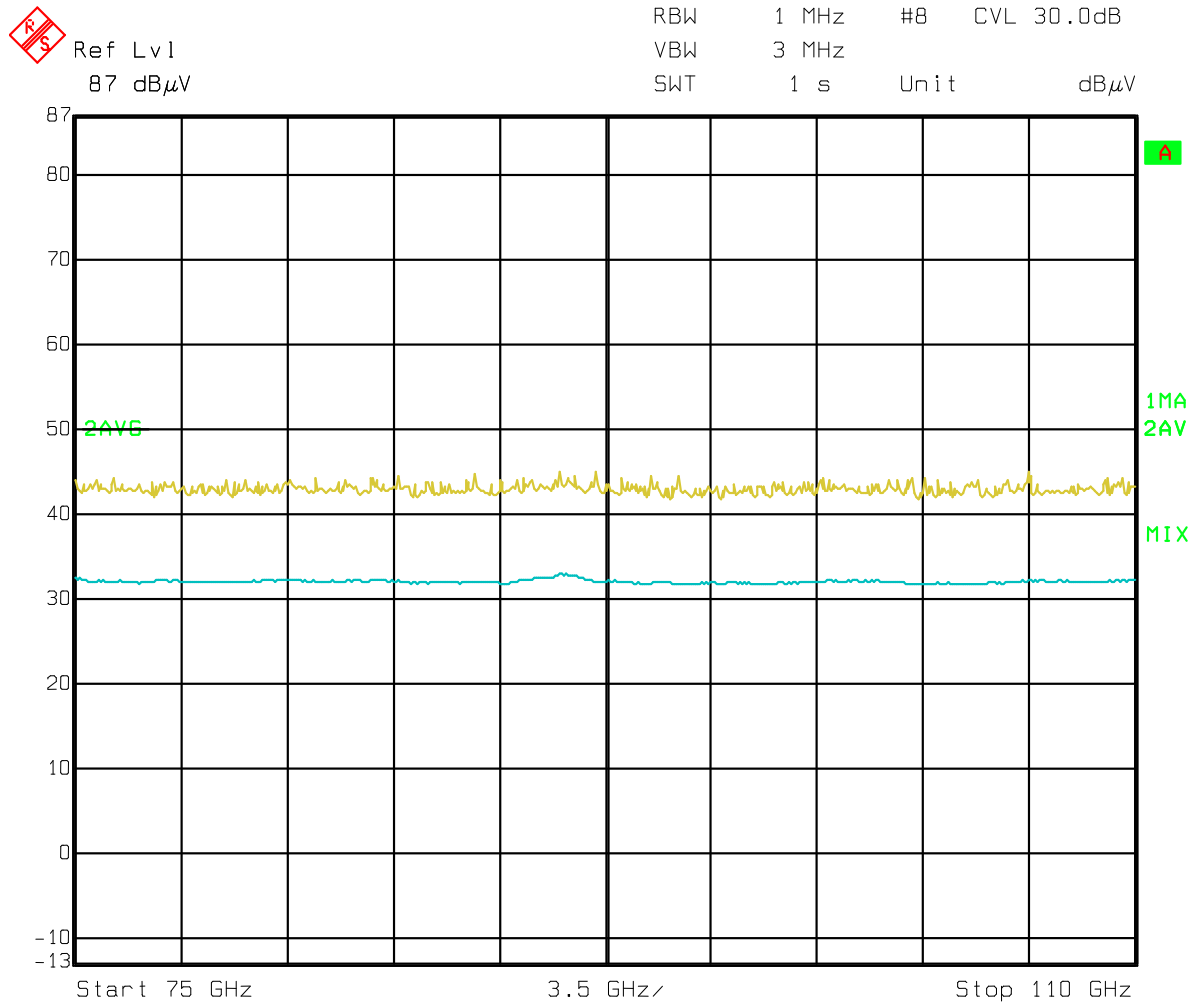
Final measurement result:
 No emission was found above the background noise.

Figure 7: Radiated emission measurement results, 40GHz-60GHz, worst data


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

Figure 8: Radiated emission measurement results, 60GHz-90GHz, worst data


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

Figure 9: Radiated emission measurement results, 90GHz-110GHz, worst data


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 : 2014-08-11
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 -11.3dBm(0.0741mW), hence the Maximum Permissible Exposure (MPE) value:

$$Pd = \frac{P_{out} * G}{4\pi R^2} = \frac{0.0741 \times 1}{4 \times 3.14159 \times 20^2} = 1.474 \times 10^{-5} \text{ mW / cm}^2 < 1 \text{ mW / cm}^2$$

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

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