

Prüfbericht-Nr.: <i>Test Report No.:</i>	50105948 001	Auftrags-Nr.: <i>Order No.:</i>	114068806	Seite 1 von 43 Page 1 of 43
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	August 30, 2017	
Auftraggeber: <i>Client:</i>	Beijing TPCast Technologies Limited Company., Room 301-09, 3rd Floor, No. 22 Building, No.1 Yard, 1st Street of Wuliqiao, Chaoyang District, Beijing.P.R. China.			
Prüfgegenstand: <i>Test item:</i>	PC Transmitter			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	TX-2			
Auftrags-Inhalt: <i>Order content:</i>	FCC/IC Test report			
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 12.255 RSS-210 Issue 9 Annex J			
Wareneingangsdatum: <i>Date of receipt:</i>	05/17/2017			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000525385-004			
Prüfzeitraum: <i>Testing period:</i>	21-Jun-2017 - 23-Jun-2017			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Laboratory Taipei			
Prüflaboratorium: <i>Testing laboratory:</i>	TUV Rheinland Taiwan Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
Report date / tested by:		kontrolliert von / reviewed by:		
2017-11-03 Ryan W. T. Chen / Project Manager		2017-11-03 Arvin Ho/Vice General Manager		
Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
<p>* 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</p> <p>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</p>				
<p>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></p>				

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: *Passed*

5.1.2 OUTPUT POWER EIRP

RESULT: *Passed*

5.1.3 OUTPUT POWER CONDUCTED

RESULT: *Passed*

5.1.4 6dB BANDWIDTH AND 99% BANDWIDTH

RESULT: *Passed*

5.1.5 FREQUENCY STABILITY

RESULT: *Passed*

5.1.6 SPURIOUS EMISSION FREQUENCY RANGE 30MHZ TO 40 GHZ

RESULT: *Passed*

5.1.7 SPURIOUS EMISSION FREQUENCY RANGE 40 GHZ TO 200 GHZ

RESULT: *Passed*

5.2.1 MAINS CONDUCTED EMISSIONS

RESULT: *Passed*

6.1.1 ELECTROMAGNETIC FIELDS

RESULT: *Passed*

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1. General Remarks

1.1 Complementary Materials

The following attachments are integral parts of this test report:

Appendix P: Photo Documentation internal view
(File Name: 50105948APPENDIX P)

Appendix D: Test Result of Radiated Emissions
(File Name: 50105948APPENDIX D)

Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 12.255
RSS-210 Issue 9 Annex J
ANSI C63.10:2013

2. Test Sites

2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.
Taichung Branch Office

No.9, Lane 36, Minsheng Rd., Sec. 3, Daya District,
Taichung City 428
Taiwan (R.O.C.)

2.2 Test Facility

TUV Rheinland Taiwan Ltd.
Taipei Office

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC RegistrationNo.: 799772
IC Canada Registration No.: 9465A-1
TAF Accredited NCC Test Lab. No.:0759
TAF ISO17025 Certification effective periods: 2016-Jul-1st to 2019-Jun-30th



Testing Laboratory
0759

2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Last Calibration	Next Calibration	Used for test items
Spectrum Analyzer	Keysight	N9010A	MY52221334	06/01/2016	06/01/2018	6dB Bandwidth, Output Power, Power Density, Cond. Spurious Emissions, Rad. Spurious Emission
Harm. Mixer, 40-60 GHz	OML	WR-19	1601 1801	NCR	NCR	Spurious Emission and Frequency Band Edge
Harm. Mixer, 50-75 GHz	Keysight / VDI	N9029AV15	US54250104	NCR	NCR	Spurious Emission and Frequency Band Edge
Harm. Mixer, 75-110 GHz	Keysight / VDI	N9029AV10	US53250005	NCR	NCR	Spurious Emission and Frequency Band Edge
Harm. Mixer, 90-140 GHz	Keysight / VDI	N9029AV08	US53250003	NCR	NCR	Spurious Emission and Frequency Band Edge
Harm. Mixer, 140-220 GHz	Keysight / VDI	N9029AV05	US53250002	NCR	NCR	Spurious Emission and Frequency Band Edge
RF Detector	Millitech	DET-15RPFW0	065	NCR	NCR	Fundamental Power
Low Pass Filter, 10 MHz	Woken	WFIL-L10F	WR366WC2B1	NCR	NCR	Fundamental Power
Pre-Amplifier	Spacek Labs	SLV-20-4	16E12	NCR	NCR	Fundamental Power
Oscilloscope	Tektronix	TDS430A	B060509	NCR	NCR	Fundamental Power
Power Meter	Keysight	N1911A	MY56020004	06/14/2016	06/14/2018	Fundamental Power
Power Sensor coax 50GHz	Keysight	8487D	MY55500010	06/14/2016	06/14/2018	Fundamental Power
Power Sensor Waveguide 50-75 GHz	Keysight	V8486A	MY56110003	06/14/2016	06/14/2018	Fundamental Power
Signal Generator	Keysight	E8257D	SG53400472	06/08/2016	06/08/2018	Spurious Emissions by Substitution
Source 50-75 GHz	Keysight / VDI	E8257DV15	US54250110	NCR	NCR	Spurious Emissions by Substitution
Source 75-110 GHz	Keysight / VDI	E8257DV10	US53250015	NCR	NCR	Spurious Emissions by Substitution
Source 90-140 GHz	Keysight / VDI	E8257DV08	US53250005	NCR	NCR	Spurious Emissions by Substitution
Source 140-220 GHz	Keysight / VDI	E8257DV05	US53250004	NCR	NCR	Spurious Emissions by Substitution
Power Meter 75GHz -220 GHz	VDI	PM5	361V	06/13/2016	06/13/2018	Spurious Emissions by Substitution
Test Software	Farad	EZ_EMC	Ver. TUV3A1	N/A	N/A	Spurious Emission

EMI Test Receiver	R&S	ESR7	101062	2016/09/12	2017/09/12	Spurious Emission and Frequency Band Edge
Spectrum Analyzer	R&S	FSV 40	100921	2017/05/02	2018/05/01	6dB Bandwidth, Output Power, Power Density, Cond. Spurious Emissions, Rad. Spurious Emission
Spectrum Analyzer	Agilent	N9010A	MY53470241	2017/05/23	2018/05/22	6dB Bandwidth, Output Power, Power Density, Cond. Spurious Emissions, Rad. Spurious Emission
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	2016/07/29	2017/07/29	Spurious Emission and Frequency Band Edge
Preamplifier (18 GHz -40 GHz)	COM-POWER	PAM-840	461257	2016/12/01	2017/12/01	Spurious Emission and Frequency Band Edge
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM01G18G	060558	2016/11/17	2017/11/17	Spurious Emission and Frequency Band Edge
Bilog Antenna	TESEQ	CBL6111D	29802	8/10/2016	8/10/2017	Spurious Emission and Frequency Band Edge
Horn Antenna	ETS-Lindgren	3117	138160	5/25/2017	5/25/2018	Spurious Emission and Frequency Band Edge
Horn Antenna (18GHz~40GHz)	COM-POWER	AH-840	101031	11/22/2016	11/22/2017	Spurious Emission and Frequency Band Edge
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	6/14/2017	6/14/2018	Spurious Emission and Frequency Band Edge
EMI Test Receiver	R&S	ESCI7	100797	2016/12/30	2017/12/30	Mains Spurious Emission
LISN (1 phase)	R&S	ENV216	101243	6/18/2017	6/18/2018	Mains Spurious Emission
LISN	R&S	ENV216	101262	2016/06/16	2017/06/16	Mains Spurious Emission

2.4 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.5 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular schedule using in house standards or comparisons.

2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements .

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
Radiated emission of transmitter, valid up to 40 GHz	± 6 dB
Radiated emission, 40 - 132 GHz	± 6 dB
Temperature	± 1 °C
Humidity	± 5 %
DC and low frequency voltages	± 3 %

3. General Product Information

3.1 Product Function and Intended Use

PC transmitter transfers audio and video signal of PC through TPCAST wireless high-definition transfer protocol to wireless signals which is transmitted to HMD receiver.
HMD receiver accepts wireless signals from PC transmitter, through TPCAST wireless high-definition transfer protocol to restore to audio and video signal which is transmitted to helmet display.
Power box adjusts voltage and current output from power bank to the used value for HMD Receiver and HMD, and offer power supply for the both. At the same time, it transfers the positioning information from the helmet and interactive information into wireless signal, and pass back to PC for operation.

For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Table 4: Basic Information of EUT

Item	EUT information
Kind of Equipment	PC Transmitter
Type Designation	TX-2
Brand Name	TPCAST
FCC ID	2AL8N-TXOC1
Canada ID	22801-TXOC1
Canada HVIN	0A

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	60.163-62.957GHz
Channel number	2
Operation Voltage	12Vdc
Modulation	16-QAM, QPSK, BPSK
Antenna gain	18 dBi

3.3 Independent Operation Modes

Basic operation modes are:

- A. Transmitting
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

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

Setup for testing: Test samples are provided with a USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate.

The samples were used as follows:

Radiation: A000525385-004

Full test was applied on all test modes, but only worst case was shown

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

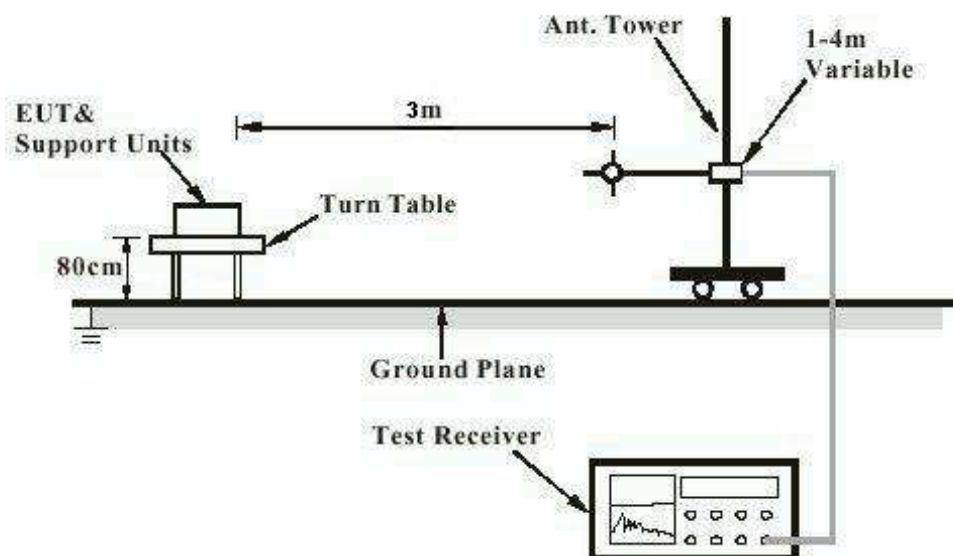
Description	Manufacturer	Model No.	Serial No.
Notebook(EMC-06)	Lenovo	TP00048A	PB-0F8B2

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 30 MHz to 40 GHz



Note: Measurements in the range 1 GHz to 40 GHz are done with a table height of 1.5m

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

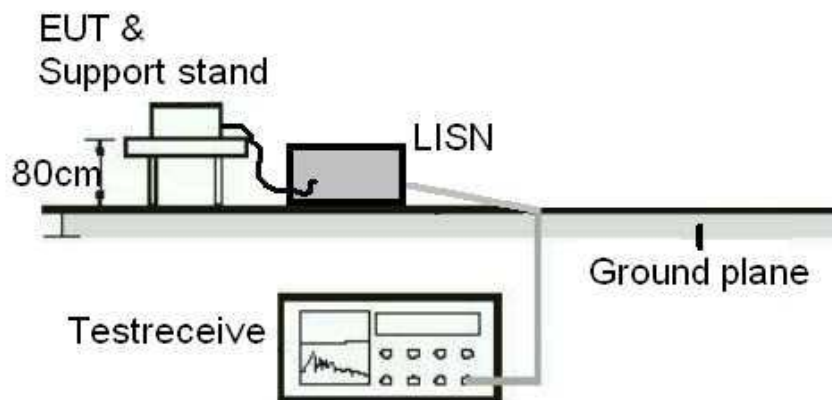
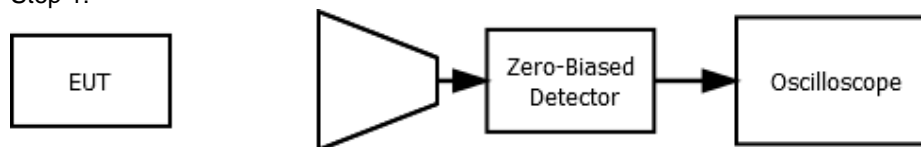
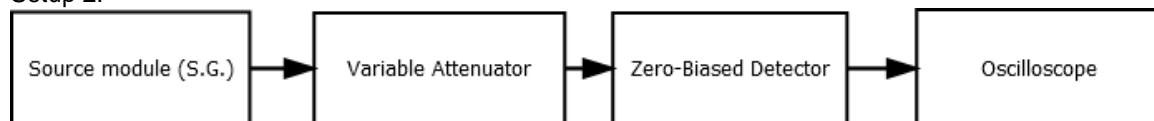


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement

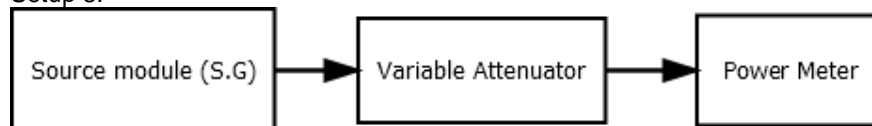
Step 1:



Setup 2:



Setup 3:



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Passed**

Test standard	:	LP0002(2016): 2.2, 3.10.1, (3) FCC Part 12.255(b)(4), Part 15.203 and RSS- Gen 8.3
Requirement	:	use of approved antennas only

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 18 dBi. The antenna is a antenna array with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

5.1.2 Output Power EIRP

RESULT:**Passed**

Test standard : LP0002(2016): 3.10.1, (2)
FCC Part 15.255(b)(3), RSS-210 Annex J.2.2
Basic standard : ANSI C63.10:2013,
Kind of test site : Shielded room

Test setup

Test Channel : Low/ Middle/ High
Operation Mode : A
Ambient temperature : 20-24 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

Limit

§ 15.255(b)(1)(i) Except as indicated in paragraph (b)(1)(ii) of this section, the average power of any emission shall not exceed 40 dBm and the peak power of any emission shall not exceed 43 dBm.

Table 6: Test result of Peak Output Power

LRP:

Channel Plan (GHz)	Test Freq. (GHz)	DSO (mV)		Power Measured (dBm)		EMeas (dBuV/m) (note1)		EIRP (dBm) (note2)		EIRP Limit (dBm)	
		Peak	AV	Peak	AV	Peak	AV	Peak	AV	Peak	AV
Channel 2 LRP: 60.16-60.80	60.16	70.4	61.6	-14.81	-16.15	137.03	135.69	32.33	30.99	43	40
	60.48	45.6	40.8	-15.8	-17.01	136.09	134.88	31.39	30.18	43	40
	60.8	28.4	25	-16.56	-17.9	135.38	134.04	30.68	29.34	43	40
Channel 3 LRP: 62.32-62.96	62.32	22.4	20.4	-18.47	-19.08	133.68	133.07	28.98	28.37	43	40
	62.64	35.6	33	-14.54	-14.71	137.65	137.48	32.95	32.78	43	40
	62.96	53.6	51.6	-18.61	-18.97	133.63	133.27	28.93	28.57	43	40

 note1 - Emeas= $126.8 - 20\log(\lambda) + \text{Power measured} - \text{Measurement Antenna Gain}$

 note2 - EIRP= $\text{EMeas} + 20\log(\text{Measurements distance}) - 104.7$

 note3 - $\lambda = 300/\text{Frequency(MHz)}$

HRP:

Channel Plan (GHz)	Test Freq. (GHz)	DSO (mV)		Power Measured (dBm)		EMeas (dBuV/m) (note1)		EIRP (dBm) (note2)		EIRP Limit (dBm)	
		Peak	AV	Peak	AV	Peak	AV	Peak	AV	Peak	AV
Channel 2 HRP: 60.48	60.48	46.4	43.2	-16.48	-17.43	135.41	134.46	30.71	29.76	43	40
Channel 3 HRP: 62.64	62.64	41.6	38.4	-17.78	-18.22	134.41	133.97	29.71	29.27	43	40

 note1 - Emeas= $126.8 - 20\log(\lambda) + \text{Power measured} - \text{Measurement Antenna Gain}$

 note2 - EIRP= $\text{EMeas} + 20\log(\text{Measurements distance}) - 104.7$

 note3 - $\lambda = 300/\text{Frequency(MHz)}$

5.1.3 Output Power conducted

RESULT:**Passed**

Test standard	:	LP0002(2016): 3.10.1, (2) FCC Part 12.255(b)(3), RSS-210 Annex J.4
Basic standard	:	ANSI C63.10:2013,
Limit	:	500 mW
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	20-24 °C
Relative humidity	:	50-65 %
Atmospheric pressure	:	100-103 kPa

Limit

§ 15.255(e) Except as specified paragraph (e)(1) of this section, the peak transmitter conducted output power shall not exceed 500 mW. Depending on the gain of the antenna, it may be necessary to operate the intentional radiator using a lower peak transmitter output power in order to comply with the EIRP limits specified in paragraph (b) of this section

Table 7: Test result of Peak Output Power
LRP:

Channel Plan (GHz)	Test Freq. (GHz)	EIRP (dBm)	Max. Ant. Gain (dBi)	Peak Power (dBm)	Peak Power (mW)	6dBc BW (MHz)	Peak Power Limit (mW)
Channel 2 LRP: 60.16-60.80	60.16	32.33	18	14.33	27.13	89.9	449.5
	60.48	31.39	18	13.39	21.83	90.37	463
	60.8	30.68	18	12.68	18.52	90.42	456
Channel 3 LRP: 62.32-62.96	62.32	28.98	18	10.98	12.53	90.32	441.5
	62.64	32.95	18	14.95	31.29	90.51	448.5
	62.96	28.93	18	10.93	12.38	89.76	456

Remark:

1. Peak power = EIRP - G(dBi) ,where: G(dBi) is gain of EUT antenna.
2. limit of peak power : 6dB BW >100MHz = 500mW , ≤ 100MHz = 500mW*(BW/100)

HRP:

Channel Plan (GHz)	Test Freq. (GHz)	EIRP (dBm)	Max. Ant. Gain (dBi)	Peak Power (dBm)	Peak Power (mW)	6dBc BW (MHz)	Peak Power Limit (mW)
Channel 2 HRP: 60.48	60.48	30.71	18	12.71	18.66	1668	500
Channel 3 HRP: 62.64	62.64	29.71	18	11.71	14.84	1550	500

Remark:

1. Peak power = EIRP - G(dBi) ,where: G(dBi) is gain of EUT antenna.
2. limit of peak power : 6dB BW >100MHz = 500mW , ≤ 100MHz = 500mW*(BW/100)

5.1.4 6dB Bandwidth and 99% Bandwidth**RESULT:****Passed**

Test standard : LP0002(2016): 3.10.1, (5)
FCC Part 12.255(a)(2), RSS-210 Annex J.4(a)
Basic standard : ANSI C63.10:2013,
Kind of test site : Shielded room

Test setup

Test Channel : Low/ Middle/ High
Operation Mode : A

Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Limit

§ 15.255(e)(1) Transmitters with an emission bandwidth of less than 100 MHz must limit their peak transmitter conducted output power to the product of 500 mW times their emission bandwidth divided by 100 MHz.

Table 8: Test result of 6dB Bandwidth**Channel 2 LRP**

Channel	Channel Frequency (GHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)
Low Channel	60.16	89.9	208.04	283.2
Mid Channel	60.48	90.37	232.54	340.1
High Channel	60.8	90.42	223.6	307.6

Channel 3 LRP

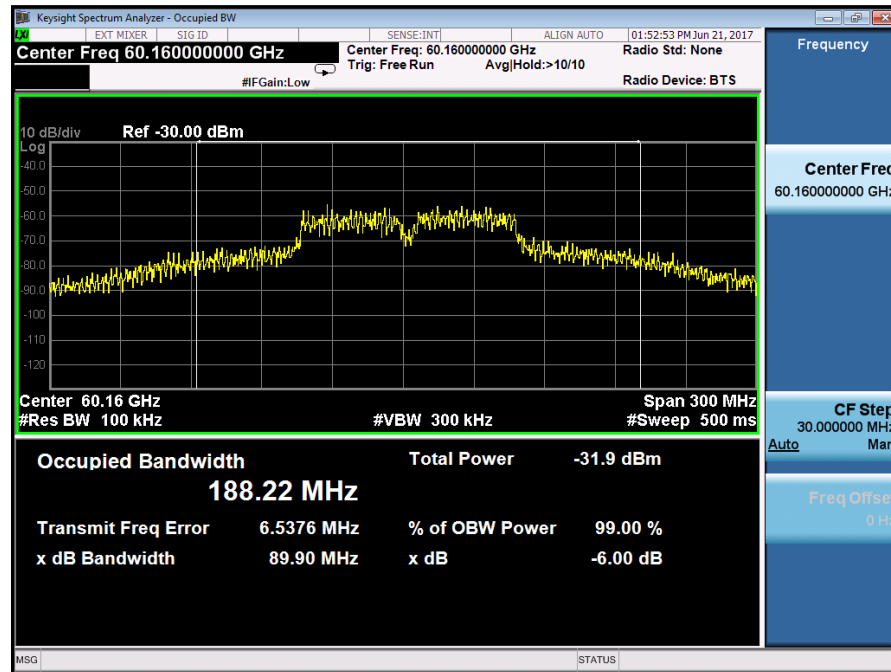
Channel	Channel Frequency (GHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)
Low Channel	60.32	90.32	220.97	302.6
Mid Channel	60.64	90.51	219.44	304.7
High Channel	60.96	89.76	181.8	248.5

HRP

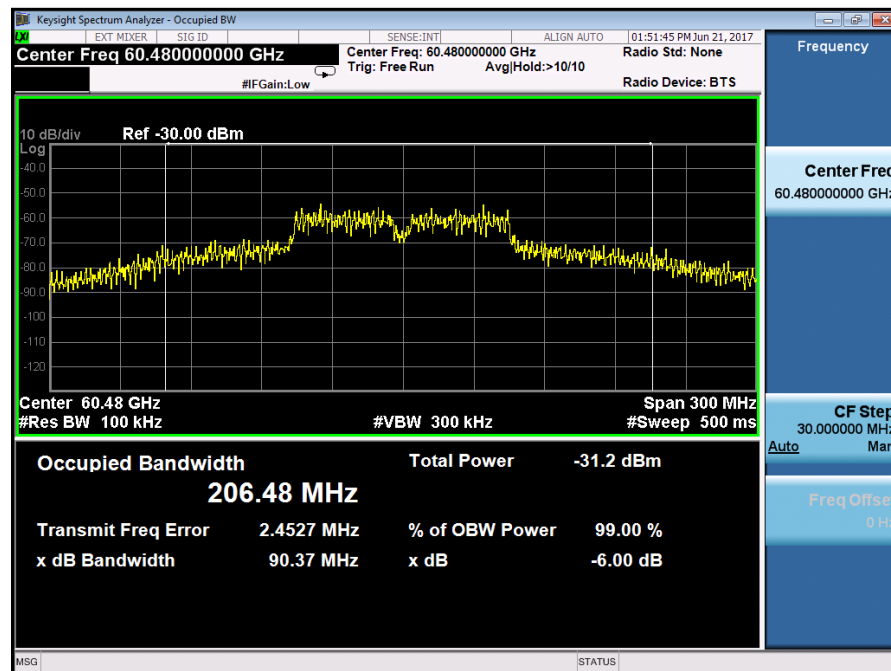
Channel	Channel Frequency (GHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	60.48	1668	1735.4
High Channel	62.64	1550	1737.7

Test Plot of 6dB Bandwidth

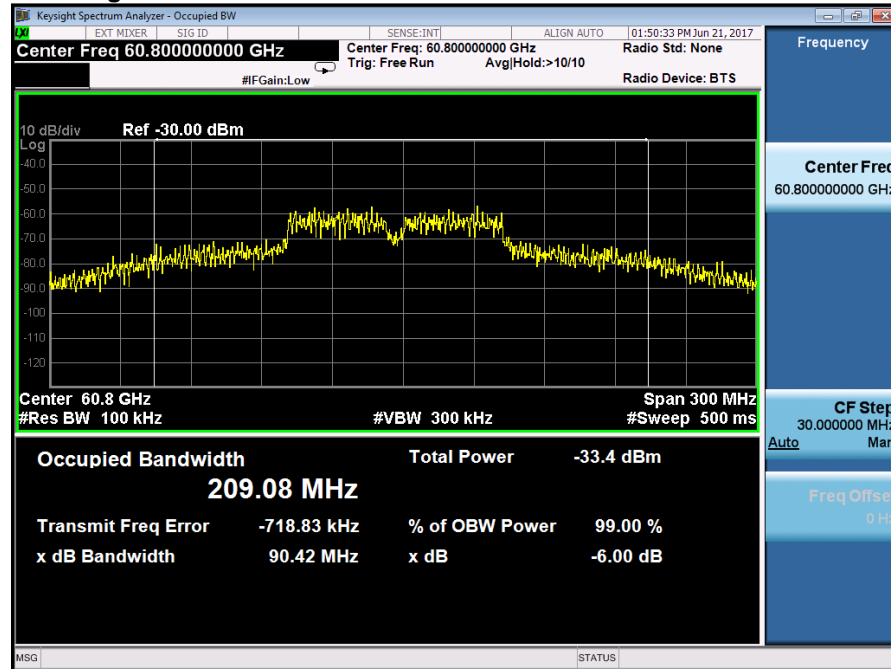
Channel 2 LRP : Low Channel



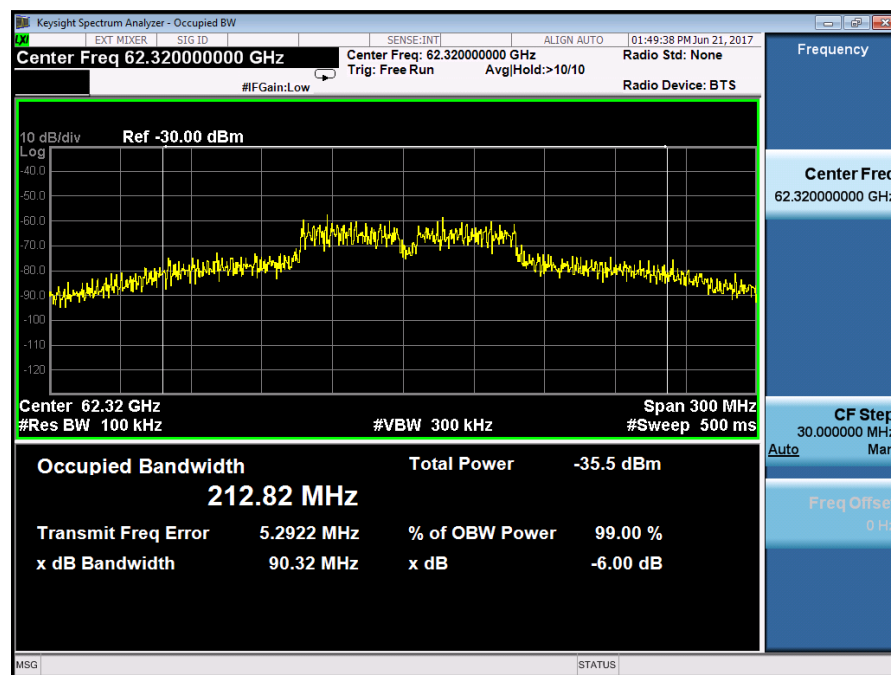
Channel 2 LRP : Middle Channel



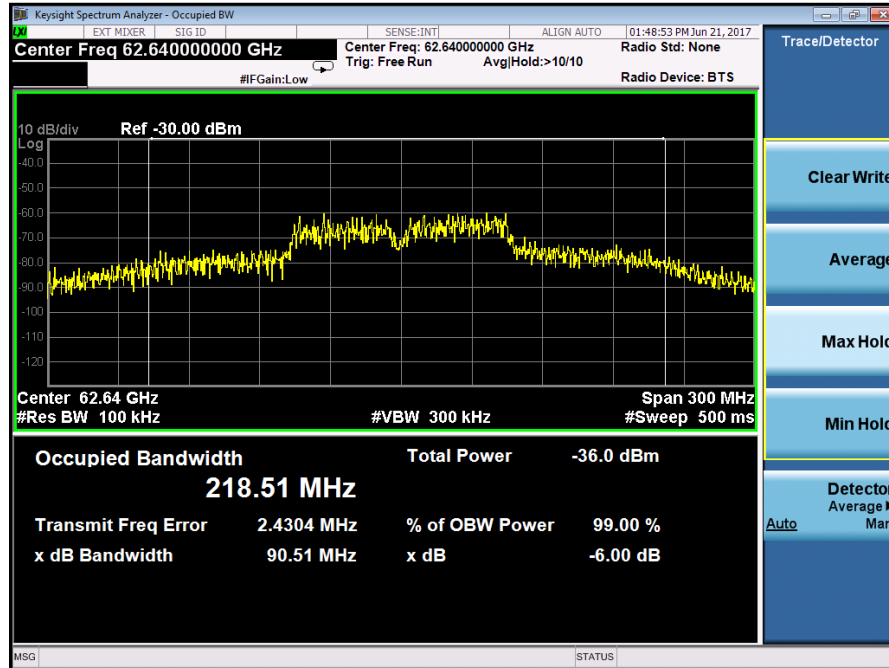
Channel 2 LRP : High Channel



Channel 3 LRP : Low Channel



Channel 3 LRP : Middle Channel



Channel 3 LRP : High Channel



Channel 2 HRP :



Channel 3 HRP :



Test Plot of 99% Bandwidth

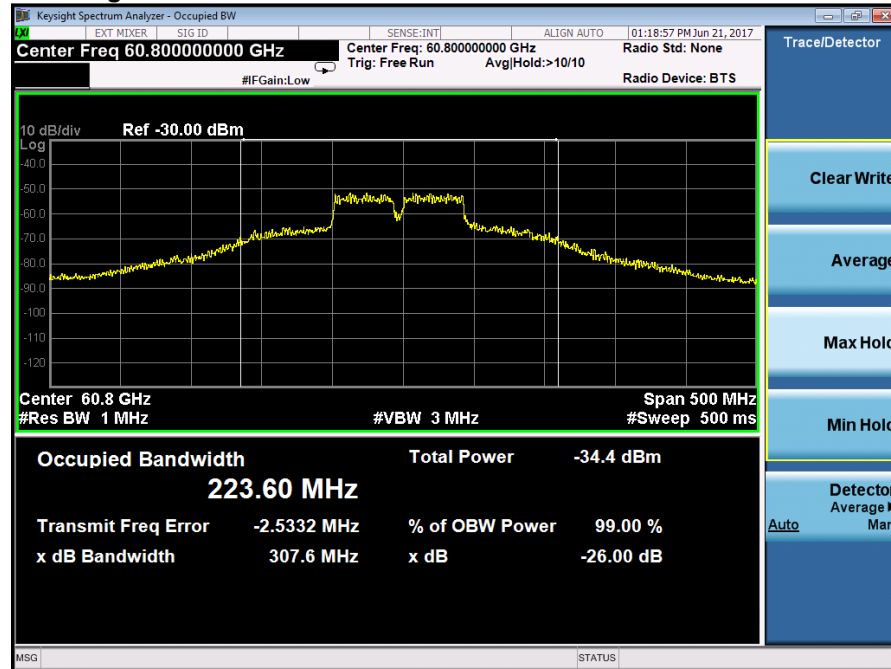
Channel 2 LRP : Low Channel



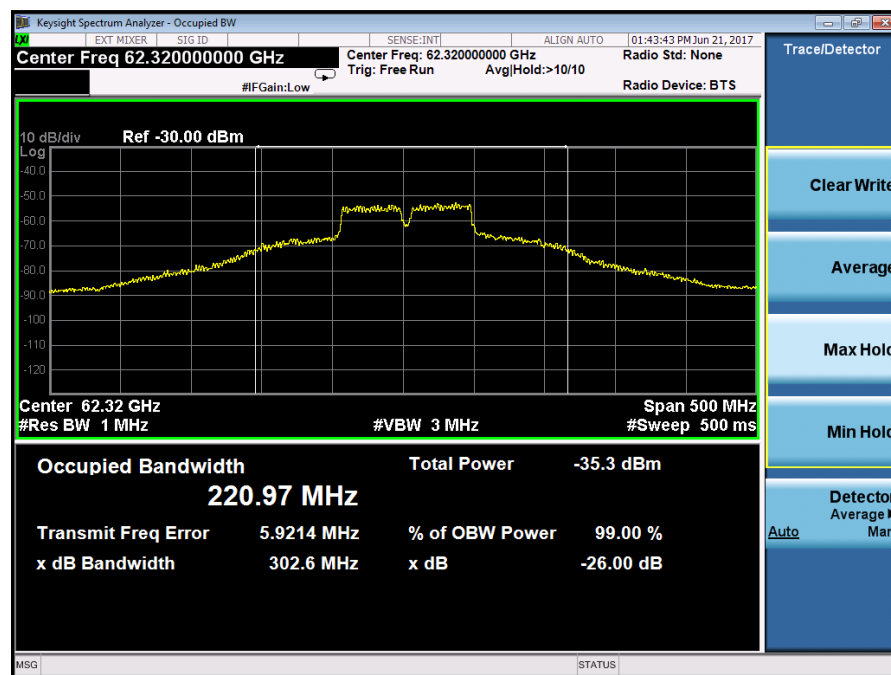
Channel 2 LRP : Middle Channel



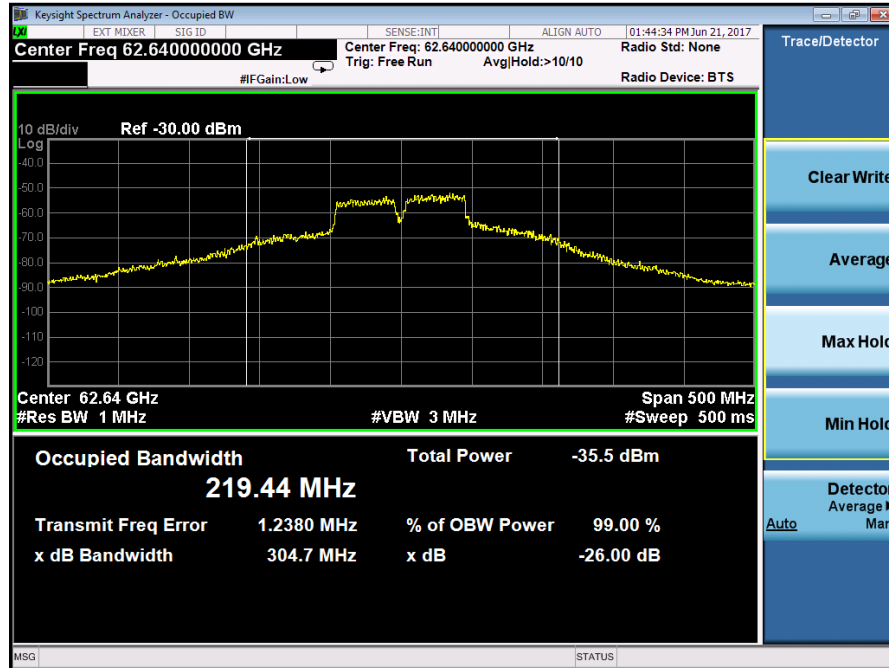
Channel 2 LRP : High Channel



Channel 3 LRP : Low Channel



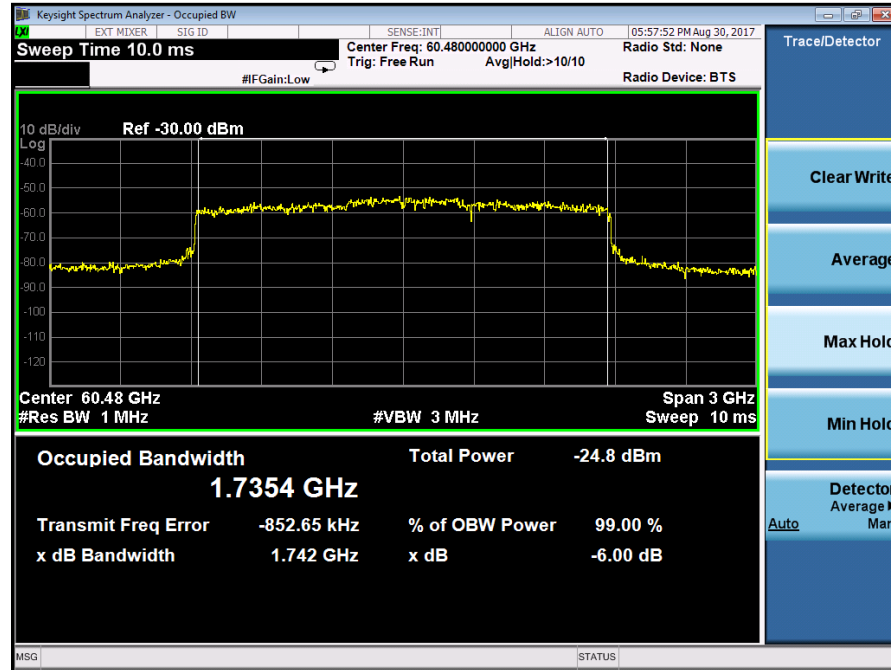
Channel 3 LRP : Middle Channel



Channel 3 LRP : High Channel



Channel 2 HRP :



Channel 3 HRP :



5.1.5 Frequency Stability

RESULT:**Passed**

Test standard : LP0002(2016) 3.2.1(3)
FCC Part 15. 255(e)
RSS-210 Annex J.6

Basic standard : ANSI C63.10:2013
Kind of test site : Shielded room

Test setup

Test Frequency : 13.56 MHz
Operation Mode : A

Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

Limit:

§ 15.255 (f) Frequency stability. Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage

Table 9: Test result of Frequency Stability

Temperature	Voltage	Measured Frequency	Delta Frequency	Limit
(°C)	(V)	(MHz)	(kHz)	(+/- kHz)
50	5	60478.999828	-3.79	Within Band
40	5	60479.009688	6.07	Within Band
30	5	60479.010704	7.08	Within Band
20	5	60479.003622	0.00	Within Band
10	5	60479.010572	6.95	Within Band
0	5	60479.006075	2.45	Within Band
-10	5	60478.993637	-9.98	Within Band
-20	5	60479.006813	3.19	Within Band

Temperature	Voltage	Measured Frequency	Delta Frequency	Limit
(°C)	(V)	(MHz)	(kHz)	(+/- kHz)
20	5.75	60478.998363	-5.92	Within Band
20	5	60479.004278	0.00	Within Band
20	4.25	60478.994261	-10.02	Within Band

5.1.6 Spurious Emission frequency range 30MHz to 40 GHz

RESULT:**Passed**

Test standard	:	FCC part 12.255(d), FCC 15.205, FCC 15.209, RSS-210 4.1 and RSS-Gen 8.9 LP0002(2016): 3.10.1, (5)
Basic standard	:	ANSI C63.10:2013
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-Gen i4, 8.9 (Table 6), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-Gen i4, 8.9 (Table 4 and 5). Radiated emissions which fall in the restricted bands, as defined in LP0002(2016): 2.7, must comply with the radiated emission limits specified in LP0002(2016): 2.8 Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a) and FCC 15.249(a), RSS-Gen i4, 8.9 (Table 4 and 5) Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in LP0002(2016): 2.8
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A

Remark: Testing was carried out within frequency range 30MHz to 40 GHz.

For details refer to Appendix D.

Testing was carried out within frequency range 30MHz to the tenth harmonic. For details refer to Appendix D. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

5.1.7 Spurious Emission frequency range 40 GHz to 200 GHz

RESULT:**Passed**

Test standard	:	FCC part 12.255(d), FCC 15.205, FCC 15.209, RSS-210 J.3, RSS-210 J.5 and RSS-Gen 8.9 LP0002(2016): 3.10.1, (5)
Basic standard	:	ANSI C63.10:2013
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-Gen i4, 8.9 (Table 6), must comply with the radiated emission limits specified in FCC part 12.255(d) and RSS-Gen i4, 8.9 (Table 4 and 5).
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A

Table 10: Test result of Channel 2 LRP: 60.16-60.80
Low Channel

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
44.68	0.5	-54.358	24	-18.93
EIRP (W)	Specification Distance (m)	Power Density (W/cm ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
0.00001278	3	0.000000113	11.30	90

Middle Channel

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
44.06	0.5	-54.308	24	-19.01
EIRP (W)	Specification Distance (m)	Power Density (W/cm ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
0.00001257	3	0.000000111	11.12	90

High Channel

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
45.19	0.5	-54.881	24	-19.36
EIRP (W)	Specification Distance (m)	Power Density (W/cm ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
0.00001159	3	0.000000102	10.25	90

Table 11: Test result of Channel 3 LRP: 62.32-62.96
Low Channel

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
45.18	0.5	-54.995	24	-19.47
EIRP (W)	Specification Distance (m)	Power Density (W/cm ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
0.00001129	3	0.000000100	9.98	90

Middle Channel

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
45.2	0.5	-54.79	24	-19.27
EIRP (W)	Specification Distance (m)	Power Density (W/cm ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
0.00001184	3	0.000000105	10.47	90

High Channel

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
44.69	0.5	-54.708	24	-19.28
EIRP (W)	Specification Distance (m)	Power Density (W/cm ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
0.00001180	3	0.000000104	10.43	90

Table 12: Test result of HRP: 60.48 ,62.64
Low Channel

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
48.38	0.5	-48.803	24	-12.69
EIRP (W)	Specification Distance (m)	Power Density (W/cm ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
0.00005385	3	0.000000476	47.61	90

High Channel

Frequency (GHz)	Measurement Distance (m)	Measured Power (dBm)	Rx Antenna Gain (dBi)	EIRP (dBm)
49.99	0.5	-53.415	24	-17.02
EIRP (W)	Specification Distance (m)	Power Density (W/cm ²)	Power Density (pW/cm ²)	Limit (pW/cm ²)
0.00001988	3	0.000000176	17.58	90

5.2 Mains Emissions

5.2.1 Mains Conducted Emissions

RESULT:**Passed**

Test standard	:	FCC Part 15.207 FCC Part 15.107 RSS-Gen 8.8 LP0002: 2.3
Limits	:	Mains Conducted emissions as defined in above test standards must comply with the mains conducted emission limits specified
Kind of test site	:	Shielded Room

Test setup

Test Channel	:	Middle
Operation mode	:	A

Remark: For details refer to Appendix D.

6. Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT:
Passed

Test standard : FCC KDB Publication 447498 D01
 RSS-102 issue 5, Table 4

Separation distance is more than 20 cm, thus mobile device exposure limits can be applied

Maximum Exposure:

Power to Antenna (mW)	30.06 mW
Power to Antenna (dBm)	14.8 dBm
Antenna Gain	18 dBi
Power+Ant Gain	1896.7 mW
Distance	20 cm
S=	0.377 mW/cm ²

Limit FCC: 1.0 mW/cm²

Limit Canada: 1.0 mW/cm²

FCC:

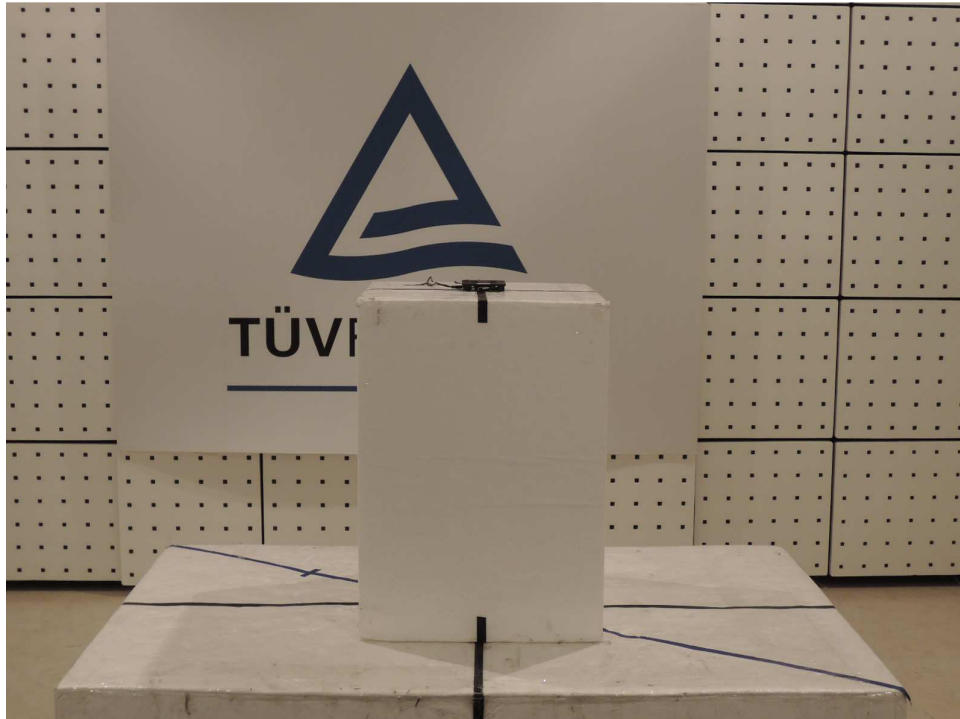
0.3-1.34 MHz	(100) mW/cm ²
1.34-30 MHz	(180/f ²) mW/cm ²
30-300 MHz	0.2 mW/cm ²
300-1500 MHz	f/1500 mW/cm ²
1500-100,000 MHz	1.0 mW/cm ²

Canada:

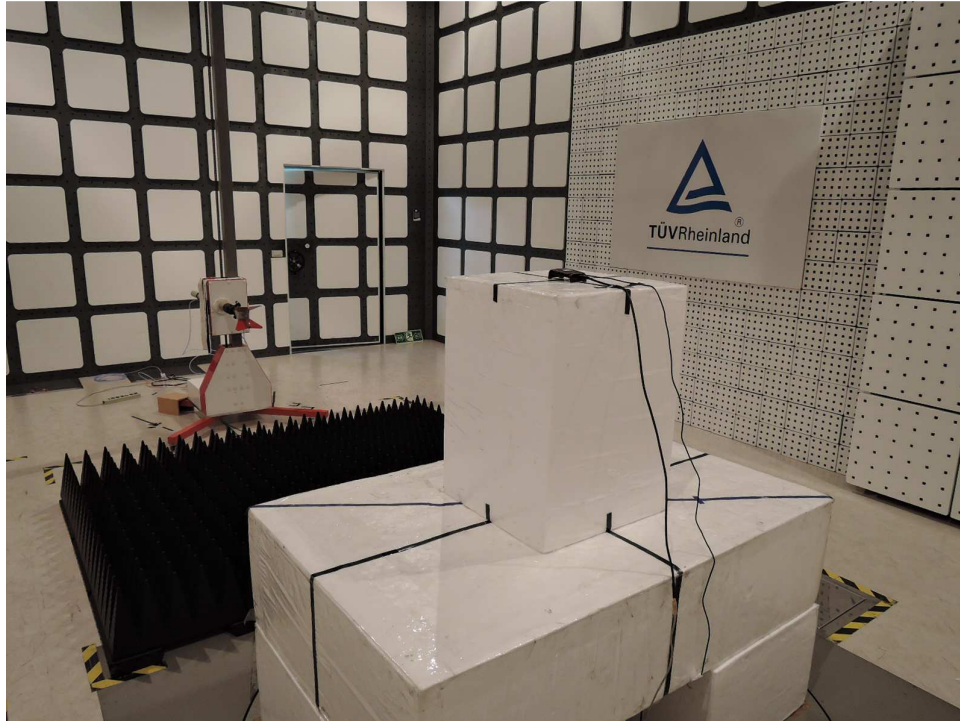
10-20 MHz	0.2 mW/cm ²
20-48 MHz	(0.8944/f ^{0.5}) mW/cm ²
48-300 MHz	0.129 mW/cm ²
300-6000 MHz	(0.002619*f ^{0.6834}) mW/cm ²
6-15 GHz	1.0 mW/cm ²
15-150 GHz	1.0 mW/cm ²

7. Photographs of the Test Set-Up

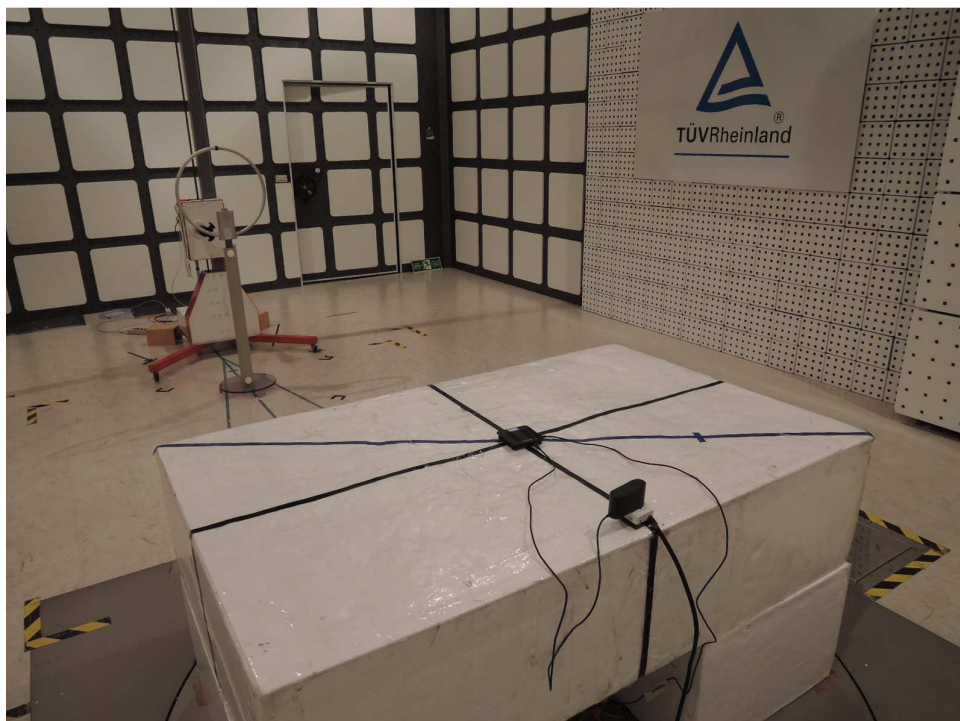
Photograph 1: Set-up for Spurious Emissions (Front View)



Photograph 2: Set-up for Spurious Emissions (Back View 1)



Photograph 3: Set-up for Spurious Emissions (Back View 2)



Photograph 4: Set-up for Spurious Emissions (above 40GHz)



Photograph 5: Set-up for for Mains Conducted testing Back



Photograph 6: Set-up for for Mains Conducted testing Front



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