FCC RF Report

Product Name: Radio Transmission System

Product Model: OptiX RTN 360

Report Number: SYBH(R)02409789EB-3

FCC ID: QISRTN360R6

FCC §2.1043 Change:

- ☐ Original grant
- ☐ Class I permissive change
- ☒ Class II permissive change
- ☐ Class III permissive change

Reliability Laboratory of Huawei Technologies Co., Ltd.

(Global Compliance and Testing Center of Huawei Technologies Co., Ltd.)

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

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Notice

1. The laboratory has passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.

2. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.

3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements.

- The recognition number for the test site located in Shenzhen is 97456.
- The recognition number for the test site located in Shanghai is 684868.
- The recognition number for the test site located in Chengdu is 216797.

4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements.

- The recognition number for the test site located in Shenzhen is 6369A-1.
- The recognition numbers for the test site located in Shanghai is 6369D, which contains 6369D-1 (3m chamber) and 6369D-2 (10m chamber).
- The recognition number for the test site located in Chengdu is 6369E-1.

5. The laboratory (Reliability Laboratory of Huawei Technologies Co., Ltd.) is also named as "Global Compliance and Testing Center of Huawei Technologies Co., Ltd."; the both names have coexisted since 2009.

6. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

7. The test report is invalid if there is any evidence of erasure and/or falsification.

8. The test report is only valid for the test samples.

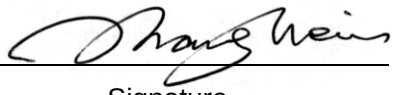
9. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

Applicant:	Huawei Technologies Co., Ltd.
Address:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name:	Radio Transmission System
Product Model:	OptiX RTN 360

Date of Receipt Sample:	2016-06-01
Start Date of Test:	2016-06-01
End Date of Test:	2016-06-07

Test Result: Pass

Approved by Senior Engineer:	2016-09-27	Ren Huasheng	
	Date	Name	Signature

Prepared by:	2016-09-27	Zhang Weimin	
	Date	Name	Signature

Modification Record

No.	Last Report No.	Modification Description
1	SYBH(R)02355539EB-1 (FCC ID: QISRTN360R6)	☐ Substituted Modification (The last report is withdrawn): Listed below are the changes: ● --- ☒ Coexistence Modification (The last report is reserved): The present product/model (#New) utilizes the same or similar radio design, shielding, interface, physical layout and so on as another product/model (#Ref). The differences and modifications between these two products/models are declared by the applicant and showed as below: ● The antenna is optimized, and the gain has a 1.5 dB additive. ● Some optimization for protocols. ● All others are identical and not changed. Considering the differences and modifications as mentioned above, the re-assessments and/or additional measurements should be required, as follows, to demonstrate that the #New also comply with the relevant standard(s): ● The measurement of “In-Band Emission” is updated (re-calculated). ● The measurement of “Spurious Emission” is checked, no obvious degradation is observed and no updated made for the original results. ● All other test results for the #New are directly derived from the test results for the #Ref.

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1 General Information

1.1 Applied Standard

Applied Rules/Standards:	● 47 CFR FCC Part 2 ● 47 CFR FCC Part 15 ● 47 CFR FCC Part 15 (10-1-14 Edition) (Note 2) ● ANSI C63.10-2013

Note 1: Unless otherwise stated, all standards listed above are accredited by A2LA.
Note 2: For test location other than TL1, the standard is only accredited by CNAS.
Note 3: For 47 CFR FCC Part 2 and 15, the newest versions, when the report issued, have no change to the tests in the report, compared with those required in older version.

References: (if applicable)	● FCC KDB 200443 Millimeter wave device measurement procedures (06/15/2015) ● 60_GHz_Clarification_Letter_30Oct2013 (FCC) ● TR 14-1001 MMW Measurements with Harmonic Mixers (FCC)

1.2 Test Location

Test Location 1 (TL1):	Global Compliance and Testing Center of Huawei Technologies Co., Ltd. (Reliability Laboratory of Huawei Technologies Co., Ltd.)
Address:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Test Location 3 (TL3):	Reliability Laboratory of Huawei Technologies Co., Ltd.
Address:	No.1899 Xiyuan Avenue, Hi-tech Western District, Chengdu, 611731, P.R.C

1.3 Test Environment Condition

Temperature:	15 to 30 °C (Ambient)
Relative Humidity:	20 to 85 % (Ambient)
Atmospheric Pressure:	Not applicable

2 Test Summary

NOTE 1: Unless otherwise specified, all test items were tested in test location TL1 which has been accredited by A2LA. The test items tested in other test locations are marked with "(TL##, ####)" where "TL##" denotes test location and "####" denotes the accreditation organization of the laboratory responsible of this report.

NOTE 2: For ISED, only requirements in RSS but not in SRSP are considered for compliance measurements for certification purposes, since the requirements of SRSP are to be addressed with the device at the time of licensing (except RSS refers to requirements of SRSP).

NOTE 3: In the following table(s), the "NA" denotes "Not applicable", the "NT" denotes "Not tested", and "NC" denotes "No conclusion".

2.1 Intentional Radiators Operating in the Band 57-64 GHz (V-Band)

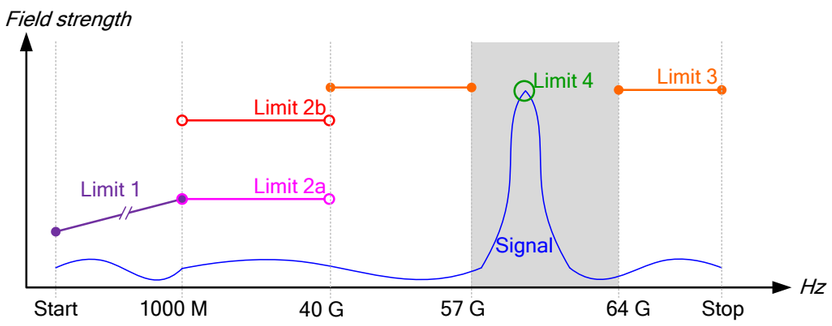
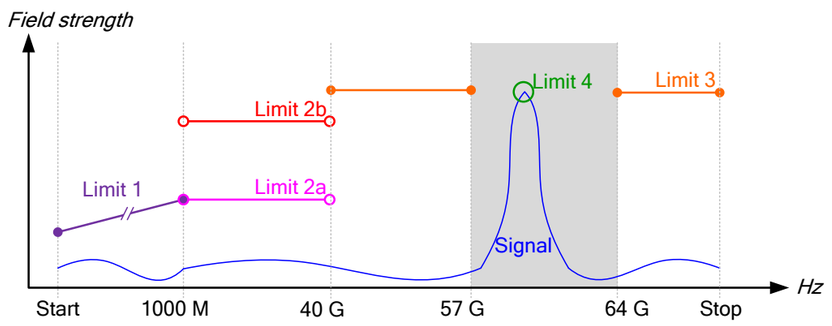
NOTE 1): In the following table(s), the terms of "intentional radiator" (used by FCC) and "license-exempt transmitter" (used by IC) have the same meaning.

2.1.1 Measurement Technical Requirements

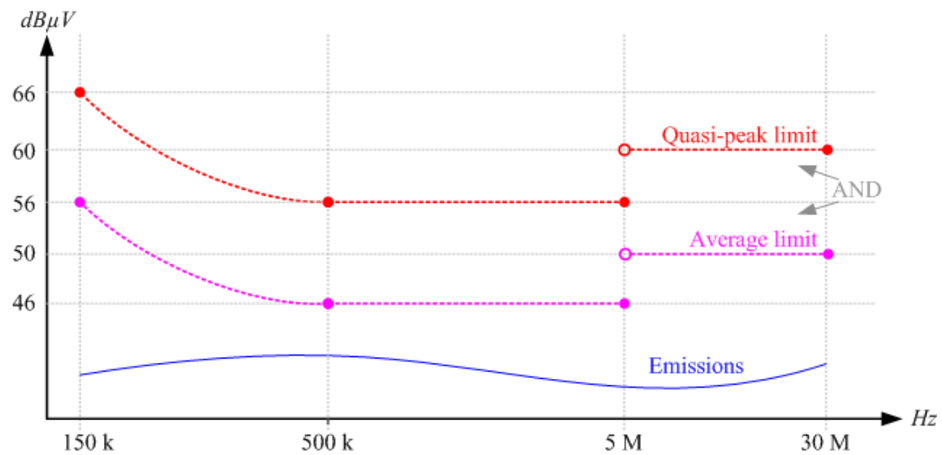
The column of "Test Result" in the following table refer to the document of "SYBH(R)02409789EB-3A":

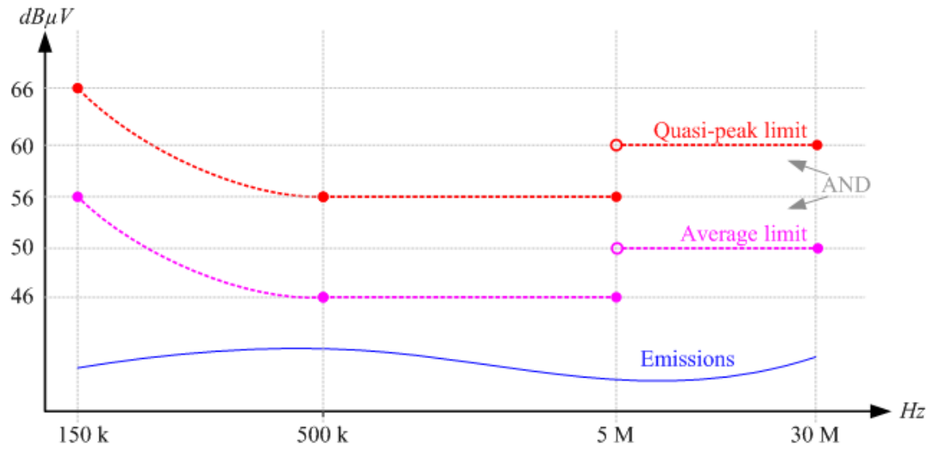
#	Test Item	FCC Rules Requirements	IC RSSs Requirements	Test Result	Verdict
1	Emission Bandwidth (6 dB)	§15.255(e): No limit. Note: According to §15.255(e)(1), 6 dB emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g., for frequency hopping devices). (Note, for the measurement method above, it means that the measured 6 dB emission bandwidth will always be larger than at least 100 kHz)	RSS-210 §J.4(c): (same as FCC) No limit. Note: According to RSS-210 §J.4(c), 6 dB emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth. The center frequency must be stationary during the measurement interval, even if not stationary normally (e.g., for frequency hopping devices). (Note, for the measurement method above, it means that the measured 6 dB emission bandwidth will always be larger than at least 100 kHz)	Appendix A	NC
2	Occupied Bandwidth (99 %)	---	RSS-Gen §6: No limit.	Appendix A	NC
3	In-Band Emission	§15.255(b), §15.255(e), KDB 200443: (1) Fixed field disturbance sensors (bandwidth ≤ 500MHz & in 61-61.5GHz): (see Note 1) Average EIRP power within 61-61.5 GHz ≤ 40 dBm; and, Peak EIRP power within 61-61.5 GHz ≤ 43 dBm; and, Average EIRP power within 57-61 GHz or 61.5-64 GHz ≤ 10 dBm; and, Peak EIRP power within 57-61 GHz or 61.5-64 GHz ≤ 13 dBm; and, Peak transmitter conducted output power: ■ 6 dB emission bandwidth < 100MHz: ≤ 500 mW * (6 dB emission bandwidth / 100 MHz). ■ Other: ≤ 500 mW. (2) Fixed field disturbance sensors (others): Peak EIRP power within 57-64 GHz ≤ 10 dBm; and, Peak transmitter conducted output power within 57-64 GHz ≤ -10 dBm. (see Note 4) (3) Others: (see Note 2)	RSS-210 §J.2, RSS-210 §J.4: (similar to FCC) (1) Fixed field disturbance sensors (bandwidth ≤ 500 MHz & in 61-61.5 GHz): (same as FCC) (see Note 1) Average EIRP power within 61-61.5 GHz ≤ 40 dBm; and, Peak EIRP power within 61-61.5 GHz ≤ 43 dBm; and, Average EIRP power within 57-61 GHz or 61.5-64 GHz ≤ 10 dBm; and, Peak EIRP power within 57-61 GHz or 61.5-64 GHz ≤ 13 dBm; and, Peak transmitter conducted output power: ■ 6 dB emission bandwidth < 100MHz: ≤ 500 mW * (6 dB emission bandwidth / 100 MHz). ■ Other: ≤ 500 mW. (2) Fixed field disturbance sensors (others): (same as FCC) Peak EIRP power within 57-64 GHz ≤ 10 dBm; and, Peak transmitter conducted output power within 57-64 GHz ≤ -10 dBm. (see Note 4) (3) Others: (same as FCC, except for device locations classification in (3))	Appendix B	Pass

#	Test Item	FCC Rules Requirements	IC RSSs Requirements	Test Result	Verdict
		● Outdoor only: Average EIRP power within 57-64 GHz ≤ 82 dBm - IF{G ≥ 51 dBi, 0, CEILING(51 dBi - G) * 2} dB; and, Peak EIRP power within 57-64 GHz ≤ 85 dBm - IF{G ≥ 51 dBi, 0, CEILING(51 dBi - G) * 2} dB; and, Peak transmitter conducted output power: ■ 6 dB emission bandwidth < 100MHz: ≤ 500 mW * (6 dB emission bandwidth / 100 MHz). ■ Other: ≤ 500 mW. ● All (indoor, or outdoor): Average EIRP power within 57-64 GHz ≤ 40 dBm; and, Peak EIRP power within 57-64 GHz ≤ 43 dBm. Peak transmitter conducted output power: ■ 6 dB emission bandwidth < 100MHz: ≤ 500 mW * (6 dB emission bandwidth / 100 MHz). ■ Other: ≤ 500 mW. ——— Note 1: There is no clear definition/reference for bandwidth as specified in §15.255(b)(2) "… that occupy 500 MHz or less of bandwidth …", it can be considered as nominal channel bandwidth. Note 2: According to FCC KDB 200443, the supporting document "60 GHz Clarification Letter 30Oct2013 clarifies" that products other than fixed field disturbance sensors, operating in this band and located outdoors, may choose to comply with either limit. Note 3: For EIRP power, a) According to §15.255(b), the power is measured during the transmit interval. b) According to §15.255(b)(4), the peak power shall be measured with an RF detector that has a detection bandwidth that encompasses the 57-64 GHz band and has a video bandwidth of at least 10 MHz. The average emission levels shall be calculated based on the measured peak levels, over the actual time period during which transmission occurs. Measurement procedures that have been found to be acceptable to the Commission in accordance with §2.947 of this chapter may be used to demonstrate compliance. Note 4: The peak transmitter conducted output power is required by both §15.255(b) and §15.255(e). The limit in §15.255(b) is always stringent than that in §15.255(e), based on that the measured 6 dB emission bandwidth will always be larger than at least 100 kHz (see Note of test item of "Emission Bandwidth (6 dB)"). Note 5: For Peak transmitter conducted output power, a) According to§15.255(e)(2), Peak transmitter conducted output power shall be measured with an RF detector that has a detection bandwidth that encompasses the 57-64 GHz band and that has a video bandwidth of at least 10 MHz. Measurement procedures that have been found to be acceptable to the Commission in accordance with §2.947 of this chapter may be used to demonstrate compliance. (Same as Note 3 for EIRP power) b) According to§15.255(e)(3), For purposes of demonstrating compliance with this paragraph, corrections to the transmitter conducted output power may be made due to the antenna and circuit loss. Note 6: According to ANSI C63.10-2013 §9.5, the relation between EIRP and transmitter conducted output power (P_cond) is: EIRP [dBm] = P_cond [dBm] + G [dBi].	● Outdoor: Average EIRP power within 57-64 GHz ≤ 82 dBm - IF{G ≥ 51 dBi, 0, CEILING(51 dBi - G) * 2} dB; and, Peak EIRP power within 57-64 GHz ≤ 85 dBm - IF{G ≥ 51 dBi, 0, CEILING(51 dBi - G) * 2} dB; and, Peak transmitter conducted output power: ■ 6 dB emission bandwidth < 100MHz: ≤ 500 mW * (6 dB emission bandwidth / 100 MHz). ■ Other: ≤ 500 mW. ● Others: Average EIRP power within 57-64 GHz ≤ 40 dBm; and, Peak EIRP power within 57-64 GHz ≤ 43 dBm. Peak transmitter conducted output power: ■ 6 dB emission bandwidth < 100MHz: ≤ 500 mW * (6 dB emission bandwidth / 100 MHz). ■ Other: ≤ 500 mW. ——— Note 1: There is no clear definition/reference for bandwidth as specified in RSS-210 §J.2.1(a) "… that occupy a bandwidth of 500 MHz or less …", it can be considered as nominal channel bandwidth. Note 2: (void) Note 3: For EIRP power: a) According to RSS-210 §J.2, power is measured during the transmit interval. b) According to RSS-210 §J.5(b), peak power density and peak transmitter output power shall be measured with a radio frequency (RF) detector that has a detection bandwidth encompassing the band 57-64 GHz and a video bandwidth of at least 10 MHz, or using an equivalent measurement method. c) According to RSS-210 §J.5(d), The average emission limits shall be calculated based on the measured peak levels over the time period during which transmission occurs. Note 4: The peak transmitter output power is required by both RSS-210 §J.2.1(c) and RSS-210 §J.4. The limit in RSS-210 §J.2.1(c) is always stringent than that in RSS-210 §J.4, based on that the measured 6 dB emission bandwidth will always be larger than at least 100 kHz (see Note of test item of "Emission Bandwidth (6 dB)"). Note 5: For Peak transmitter conducted output power, a) According to RSS-210 §J.5(b), peak power density and peak transmitter output power shall be measured with a radio frequency (RF) detector that has a detection bandwidth encompassing the band 57-64 GHz and a video bandwidth of at least 10 MHz, or using an equivalent measurement method. b) According to §J.4(b), For the purposes of demonstrating compliance with this RSS, corrections to the transmitter output power may be made in the event of antenna and circuit loss. Note 6: According to RSS-210 §J.5(c), Conducted measurement for emissions above 40 GHz will be permitted provided that the antenna characteristics can be determined accurately. Note 7: According to ANSI C63.10-2013 §9.5, the relation between EIRP and transmitter conducted output power (P_cond) is: EIRP [dBm] = P_cond [dBm] + G [dBi].		
4	Spurious	§15.255(c), §15.209,§15.31, §15.33, §15.35:	RSS-210 §J.3, RSS-Gen §8.9, RSS-Gen §8.1, RSS-Gen §6.13, RSS-Gen §6.4 (similar to FCC):	Appendix	Pass

#	Test Item	FCC Rules Requirements	IC RSSs Requirements	Test Result	Verdict
	emissions (TL3, CNAS for < 40 GHz)	 According to §15.33(a), Start = MAX{the lowest radio frequency signal generated in the device, 9 kHz}. Stop ≥ MIN{the fifth harmonic of the highest fundamental frequency, 200 GHz}. According to §15.255(c), Limit 1 = general radiated emissions limits of §15.209 (the tighter limit applies at the boundary between the frequency ranges), and according to §15.35(b), summarized as below: --- - 9-90 kHz 200-300 Hz Average 2400/f[kHz] µV/m @ 300 m Peak 20*lg(2400/f[kHz]) + 20 dBµV/m @ 300 m 90-110 kHz 200-300 Hz QP 2400/f[kHz] µV/m @ 300 m 110-150 kHz 200-300 Hz Average 2400/f[kHz] µV/m @ 300 m Peak 20*lg(2400/f[kHz]) + 20 dBµV/m @ 300 m 150-490 kHz 9-10 kHz Average 2400/f[kHz] µV/m @ 300 m Peak 20*lg(2400/f[kHz]) + 20 dBµV/m @ 300 m 0.49-1.705 MHz 9-10 kHz QP 24000/f[kHz] µV/m @ 30 m 1.705-30 MHz 9-10 kHz QP 30 µV/m @ 30 m 30-88 MHz 100-120 kHz QP 100 µV/m @ 3 m 88-216 MHz 100-120 kHz QP 150 µV/m @ 3 m 216-960 MHz 100-120 kHz QP 200 µV/m @ 3 m 960-1000 MHz 100-120 kHz QP 500 µV/m @ 3 m *: see CISPR-16 for the measurement bandwidths, according to §15.35(a). *: see §15.31 for measuring emissions at distances other than specified. --- - Limit 2a = general radiated emissions limits of §15.209, summarized as below: --- - 1000-40000 MHz 1 MHz Average 500 µV/m @ 3 m --- Note: a) According to ANSI C63.10-2013 §9.5, the relation between power density (Pd [W/m^2]) and E-field strength (E [V/m]) is: Pd = E^2 / 377. So, ● x [µW/cm^2] correspond to 10*lg(x) + 125.763 [dBµV/m]. ● x [nW/cm^2] correspond to 10*lg(x) + 95.763 [dBµV/m].	 According to RSS-Gen §6.13, RSS-210 §J.5(a), Start = MAX{MIN{the lowest radio frequency signal generated in the device, 30 MHz}, 9 kHz}. Stop ≥ MIN{the fifth harmonic of the highest fundamental frequency, 200 GHz}. According to RSS-210 §J.3, Limit 1 = general radiated emissions limits of RSS-Gen §8.9 (the tighter limit applies at the boundary between the frequency ranges), and according to RSS-Gen §8.1, as below: --- - 9-90 kHz 200-300 Hz Average 2400/f[kHz] µV/m @ 300 m Peak 20*lg(2400/f[kHz]) + 20 dBµV/m @ 300 m 90-110 kHz 200-300 Hz QP 2400/f[kHz] µV/m @ 300 m 110-150 kHz 200-300 Hz Average 2400/f[kHz] µV/m @ 300 m Peak 20*lg(2400/f[kHz]) + 20 dBµV/m @ 300 m 150-490 kHz 9-10 kHz Average 2400/f[kHz] µV/m @ 300 m Peak 20*lg(2400/f[kHz]) + 20 dBµV/m @ 300 m 0.49-1.705 MHz 9-10 kHz QP 24000/f[kHz] µV/m @ 30 m 1.705-30 MHz 9-10 kHz QP 30 µV/m @ 30 m 30-88 MHz 100-120 kHz QP 100 µV/m @ 3 m 88-216 MHz 100-120 kHz QP 150 µV/m @ 3 m 216-960 MHz 100-120 kHz QP 200 µV/m @ 3 m 960-1000 MHz 100-120 kHz QP 500 µV/m @ 3 m *: see CISPR-16 for the measurement bandwidths, according to RSS-Gen §8.1. *: see RSS-Gen §6.4 for measuring emissions at distances other than specified. --- - Limit 2a = general radiated emissions limits of RSS-Gen §8.9, as below: --- - 1000-40000 MHz 1 MHz Average 500 µV/m @ 3 m --- Note 1: According to RSS-210 §J.5(c), Conducted measurement for emissions above 40 GHz will be permitted provided that the antenna characteristics can be determined accurately. Note 2: a) According to ANSI C63.10-2013 §9.5, the relation between power density (Pd [W/m^2]) and E-field strength (E [V/m]) is: Pd = E^2 / 377. So,	C	

#	Test Item	FCC Rules Requirements	IC RSSs Requirements	Test Result	Verdict
		● x [pW/cm^2] correspond to 10*lg(x) + 65.763 [dBμV/m]. For examples, ● 9 μW/cm^2 @ 3m correspond to 135.305 dBμV/m @ 3m, ● 18 μW/cm^2 @ 3m correspond to 138.316 dBμV/m @ 3m, ● 9 nW/cm^2 @ 3m correspond to 105.305 dBμV/m @ 3m, ● 18 nW/cm^2 @ 3m correspond to 108.316 dBμV/m @ 3m, ● 90 pW/cm^2 @ 3m correspond to 85.305 dBμV/m @ 3m. b) According to ANSI C63.10-2013 §9.5, the relation between EIRP [W] and power density (Pd [W/m^2]) at distance (d [m]) is: Pd = EIRP / (4 * PI * d^2). So, ● x [μW/cm^2] correspond to 10*lg(x) + 20*lg(d [m]) + 20.992 [dBm]. ● x [nW/cm^2] correspond to 10*lg(x) + 20*lg(d [m]) - 9.008 [dBm]. ● x [pW/cm^2] correspond to 10*lg(x) + 20*lg(d [m]) - 39.008 [dBm]. For examples, ● 9 μW/cm^2 @ 3m correspond to 40.077 dBm EIRP, ● 18 μW/cm^2 @ 3m correspond to 43.087 dBm EIRP, ● 9 nW/cm^2 @ 3m correspond to 10.077 dBm EIRP, ● 18 nW/cm^2 @ 3m correspond to 13.087 dBm EIRP, ● 90 pW/cm^2 @ 3m correspond to -9.923 dBm EIRP. c) According to ANSI C63.10-2013 §9.5, the relation between EIRP and transmitter conducted output power (P_cond) is: EIRP [dBm] = P_cond [dBm] + G [dBi].	● x [μW/cm^2] correspond to 10*lg(x) + 125.763 [dBμV/m]. ● x [nW/cm^2] correspond to 10*lg(x) + 95.763 [dBμV/m]. ● x [pW/cm^2] correspond to 10*lg(x) + 65.763 [dBμV/m]. For examples, ● 9 μW/cm^2 @ 3m correspond to 135.305 dBμV/m @ 3m, ● 18 μW/cm^2 @ 3m correspond to 138.316 dBμV/m @ 3m, ● 9 nW/cm^2 @ 3m correspond to 105.305 dBμV/m @ 3m, ● 18 nW/cm^2 @ 3m correspond to 108.316 dBμV/m @ 3m, ● 90 pW/cm^2 @ 3m correspond to 85.305 dBμV/m @ 3m. b) According to ANSI C63.10-2013 §9.5, the relation between EIRP [W] and power density (Pd [W/m^2]) at distance (d [m]) is: Pd = EIRP / (4 * PI * d^2). So, ● x [μW/cm^2] correspond to 10*lg(x) + 20*lg(d [m]) + 20.992 [dBm]. ● x [nW/cm^2] correspond to 10*lg(x) + 20*lg(d [m]) - 9.008 [dBm]. ● x [pW/cm^2] correspond to 10*lg(x) + 20*lg(d [m]) - 39.008 [dBm]. For examples, ● 9 μW/cm^2 @ 3m correspond to 40.077 dBm EIRP, ● 18 μW/cm^2 @ 3m correspond to 43.087 dBm EIRP, ● 9 nW/cm^2 @ 3m correspond to 10.077 dBm EIRP, ● 18 nW/cm^2 @ 3m correspond to 13.087 dBm EIRP, ● 90 pW/cm^2 @ 3m correspond to -9.923 dBm EIRP. c) According to ANSI C63.10-2013 §9.5, the relation between EIRP and transmitter conducted output power (P_cond) is: EIRP [dBm] = P_cond [dBm] + G [dBi].		
5	Frequency Stability	§15.255(f), 15.215(c), ANSI C63.10-2013 §9.14: Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation (see Note):  1. fL > 57 GHz, and fH < 64 GHz. 2. Test conditions: ● ambient temperature & (85/100/115 % * nominal voltage); and, ● nominal voltage & (-20/-10/0/+10/+20/+30/+40/+50 °C) Note: According to §15.215(c), Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section (Note, no emission bandwidth specified in §15.255(f)) under which the equipment operates, is contained within the frequency band	RSS-210 §J.6, RSS-Gen §8.11, RSS-Gen §6.11: Fundamental emissions shall be contained within the frequency bands specified in this section during all conditions of operation (see Note).  1. fL > 57 GHz, and fH < 64 GHz. 2. Test conditions: ● +20 °C & (85/100/115% * nominal voltage); and, ● nominal voltage & (-20/+20/+50 °C) Note: a) According to RSS-Gen §8.11, Transmitter frequency stability for licence-exempt radio apparatus shall be measured in accordance with Section 6.11. For licence-exempt radio apparatus, the frequency stability shall be measured at temperatures of -20°C (-4°F), +20°C (+68°F) and +50°C (+122°F) instead of at the temperatures specified in Section 6.11. b) According to RSS-Gen §6.11, With the transmitter installed in an environmental test chamber,	Appendix D	Pass

<table>
<tr><th>#</th><th>Test Item</th><th>FCC Rules Requirements</th><th>IC RSSs Requirements</th><th>Test Result</th><th>Verdict</th></tr>
<tr><td></td><td></td><td>designated in the rule section under which the equipment is operated. … … The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.</td><td>the unmodulated carrier frequency shall be measured under the conditions specified below. A sufficient stabilization period at each temperature shall be used prior to each frequency measurement. …</td><td></td><td></td></tr>
<tr><td>6</td><td>AC Power Line Conducted Emissions
(TL3, CNAS)</td><td>§15.207:
 

According to §15.207,
1) In the range of 150- 500 kHz, the limit decreases with the logarithm of the frequency.
2) The radio frequency voltage that is conducted back onto the AC power line is measured using a 50 μH/50 ohms line impedance stabilization network (LISN).
3) Compliance with the provisions is based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.
4) Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.</td><td>RSS-Gen §8.8 (Same as FCC):
 

According to RSS-Gen §8.8,
1) In the range of 150- 500 kHz, the limit decreases with the logarithm of the frequency.
2) The conducted emissions shall be measured in accordance with the reference ANSI C63.10-2013.
3) A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that The radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits; For any radio apparatus equipped to operate from the public utility AC power supply either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits.</td><td>Appendix E</td><td>Pass</td></tr>
</table>

2.1.2 Non-measurement Technical Requirements

#	Item	FCC Rules Requirements	IC RSSs Requirements	Exhibit	Verdict
1	Operation Restrictions	§15.255(a): Operation under the provisions of this section is NOT permitted for the following products: (1) Equipment used on aircraft or satellites. (2) Field disturbance sensors, including vehicle radar systems, unless the field disturbance sensors are employed for fixed operation. For the purposes of this section, the reference to fixed operation includes field disturbance sensors installed in fixed equipment, even if the sensor itself moves within the equipment.	RSS-210 §J.1: (Same as FCC)	Not falling into operation restrictions. See manual and/or technical specifications.	Comply
2	57.0-57.05 GHz Reserved Exclusively	§15.255(d): Only spurious emissions and transmissions related to a publicly-accessible coordination channel, whose purpose is to coordinate operation between diverse transmitters with a view towards reducing the probability of interference throughout the 57-64 GHz band, are permitted in the 57-57.05 GHz band. Note to paragraph (d): The 57-57.05 GHz is reserved exclusively for a publicly-accessible coordination channel. The development of standards for this channel shall be performed pursuant to authorizations issued under part 5 of this chapter.	---	Not designed to operate in 57-57.05 GHz. See manual and/or technical specifications.	Comply
3	Suggestion for Peak Transmitter Output Power	§15.255(e): 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.	---	Just a recommendation, not a requirement.	NC
4	Group Installations	§15.255(h): Any transmitter that has received the necessary FCC equipment authorization under the rules of this chapter may be mounted in a group installation for simultaneous operation with one or more other transmitter(s) that have received the necessary FCC equipment authorization, without any additional equipment authorization. However, no transmitter operating under the provisions of this section may be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.	RSS-210 §J.7 (Similar to FCC): Any transmitter that is certified under this RSS may be mounted in a group installation for simultaneous operation with one or more certified transmitters, without any additional equipment authorization. However, no transmitter operating under the provisions of this section may be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.	No external phase-locking inputs. See manual and/or technical specifications.	Comply
5	RF Exposure	§15.255(g): Regardless of the power density levels permitted under this section, devices operating under the provisions of this section are subject to the radiofrequency radiation exposure requirements specified in §§1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.	RSS-Gen §3.2: In addition to RSS-Gen, the requirements in RSS-102 shall be met.	See RF exposure report.	NC
6	Dedicated Antenna	§15.203: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to intentional radiators that must be professionally installed, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the	---	An integral antenna is equipped. See manual and/or technical specifications.	Comply

#	Item	FCC Rules Requirements	IC RSSs Requirements	Exhibit	Verdict
		limits in this part are not exceeded.			
7	Multiple Antenna Types	§15.204(c): An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator. An intentional radiator may be authorized with multiple antenna types. Exceptions to the following provisions, if any, are noted in the rule section under which the transmitter operates, e.g., §15.255(b)(1)(ii) of this part … …	RSS-Gen §8.3: The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus. Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. (Compliance is required under all operational combinations of transmitter output power and antenna gain.) When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer. User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location: *This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.* Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).	Just a single antenna is equipped and apply for authorization	NC
8	Specific Antenna for Products other than fixed field disturbance sensors and located outdoors	§15.255(b)(1)(ii), §15.204: The provisions of §15.204(c)(2) and (c)(4) of this part that permit the use of different antennas of the same type and of equal or less directional gain do not apply to intentional radiator systems operating under this provision. In lieu thereof, intentional radiator systems shall be certified using the specific antenna(s) with which the system will be marketed and operated. Compliance testing shall be performed using the highest gain and the lowest gain antennas for which certification is sought and with the intentional radiator operated at its maximum available output power level. The responsible party, as defined in §2.909 of this chapter, shall supply a list of acceptable antennas with the application for certification.	RSS-210 §J.1, §J.2.2 Equipment designed to operate outdoors shall not be marketed and operated with antennas other than those are listed in the certification application with which the equipment is certified. Compliance testing shall be performed using the highest gain and the lowest gain antennas with which the equipment is certified.	An integral (dedicated) antenna is equipped. See manual and/or technical specifications.	Comply
9	RF Power Amplifier	§15.204: (a) Except as otherwise described in paragraphs (b) and (d) of this section, no person shall use, manufacture, sell or lease, offer for sale or lease (including advertising for sale or lease), or import, ship, or distribute for the purpose of selling or leasing, any external radio frequency power amplifier or amplifier kit intended for use with a part 15 intentional radiator. (b) A transmission system consisting of an intentional radiator, an external radio frequency power amplifier, and an antenna, may be authorized, marketed and used under this part. Except as described otherwise in this section, when a transmission system is authorized as a system, it must always be marketed as a complete system and must always be used in the configuration in which it was authorized. … … (d) Except as described in this paragraph, an external radio frequency power amplifier or amplifier kit shall be marketed only with the system configuration with which it was approved and not as a separate	RSS-247 §2.3, RSS-Gen §8.2 (Similar to FCC): According to RSS-Gen §8.2, Except as may be set out in a specific RSS, the marketing of RF power amplifiers for use with licence-exempt radio apparatus is prohibited. According to RSS-247 §2.3, External RF Power Amplifiers (ERFPA) may be marketed separately for use with devices certified under this standard under the following conditions: (1) The ERFPA shall be certified with the device with which it is intended to be used, such that the amplifier-device combination does not exceed any of the limits specified for the device alone; and (2) The ERFPA shall be marketed only for use with the device with which it has been certified, so long as the following statement is included on the packaging and in the user manual: *Under Industry Canada regulations, this external radio frequency power amplifier (insert Industry Canada certification number of radio frequency power amplifier) may only be used with the transmitter with which the amplifier has been certified by Industry Canada. The certification number for the transmitter with which this amplifier is permitted to operate is IC:XX…X-YY…Y.*	Not external power amplifier for the device.	NC

#	Item	FCC Rules Requirements	IC RSSs Requirements	Exhibit	Verdict
		product. (1) An external radio frequency power amplifier may be marketed for individual sale provided it is intended for use in conjunction with a transmitter that operates in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands pursuant to §15.247 of this part or a transmitter that operates in the 5.725-5.825 GHz band pursuant to §15.407 of this part. The amplifier must be of a design such that it can only be connected as part of a system in which it has been previously authorized. (The use of a non-standard connector or a form of electronic system identification is acceptable.) The output power of such an amplifier must not exceed the maximum permitted output power of its associated transmitter. (2) The outside packaging and user manual for external radio frequency power amplifiers sold in accordance with paragraph (d)(1) of this section must include notification that the amplifier can be used only in a system which it has obtained authorization. Such a notice must identify the authorized system by FCC Identifier.			
10	Operating Frequency Range of Devices in Master / Slave Networks	§15.202: Client devices that operate in a master/client network may be certified if they have the capability of operating outside permissible part 15 frequency bands, provided they operate on only permissible part 15 frequencies under the control of the master device with which they communicate. Master devices marketed within the United States must be limited to operation on permissible part 15 frequencies. Client devices that can also act as master devices must meet the requirements of a master device. For the purposes of this section, a master device is defined as a device operating in a mode in which it has the capability to transmit without receiving an enabling signal. In this mode it is able to select a channel and initiate a network by sending enabling signals to other devices. A network always has at least one device operating in master mode. A client device is defined as a device operating in a mode in which the transmissions of the device are under control of the master. A device in client mode is not able to initiate a network.	RSS-Gen §8.6 (Similar to FCC): A master device is a device that can operate in a mode in which it is able to transmit without first receiving an enabling signal, and in which it is able to select a channel and initiate a network by sending enabling signals to other devices. A network always has at least one device operating in master mode. A slave device is a device operating in a mode in which the transmissions of the device are under control of the master device. A device in slave mode is not able to initiate a network. Slave devices operating in a master/slave network may be certified even if they are capable of operating outside the licence-exempt frequency bands permitted for the devices by the applicable RSS, provided that they operate only in their permitted licence-exempt frequency bands under the control of a master device. Master devices marketed within Canada must be capable of operating only in the licence-exempt frequency bands permitted for the device by applicable Industry Canada standards. Slave devices that can also act as master devices must meet the requirements of a master device.	Fixed point-to-point application. See manual and/or technical specifications.	NC
11	Location Awareness	KDB594280: (Similar to IC, but more detailed. See KDB594280 for more.)	RSS-Gen §8.6: Master devices that use location awareness technology, such as GPS, or those that can connect to a GPS device or use remote technology, such as a secure database, to auto-configure a certified device for the correct frequency and power levels — all without user interaction — are also authorized for use upon acceptance by Industry Canada. Such configurations must be capable of “locking in” the correct frequencies and operating at the appropriate power levels without requiring user override.	No location awareness technology used.	NC
12	External Controls	KDB594280: (Similar to IC, but more detailed. See KDB594280 for more.)	RSS-Gen §6.3: The device shall not have any external controls accessible to the user that enable it to be adjusted, selected or programmed to operate in violation of the regulatory requirements, including RSS-Gen and the applicable RSSs. Furthermore, information on internal adjustments, reconfiguration or programmability of the device which would in any way enable or cause the equipment to operate in violation of Industry Canada requirements must be made available only to service depots and agents of the equipment supplier, and NOT to the public.	Professional device not for public.	Comply

3 Description of the Equipment under Test (EUT)

3.1 General Description

RTN 360 is tailored for service backhaul for small cell base stations that are deployed on buildings or at the street level. RTN 360 plays an important role in the Huawei radio backhaul solution for small cell base stations.
As V-band full-outdoor radio equipment, RTN 360 has the following characteristics:

- RTN 360 operates at the frequency band ranging from 59 GH to 64 GHz. It requires unobstructed line of sight (LOS) and features low inter-site interference and rich idle frequency spectrum resources. A V-band link can span a maximum distance of 300 m, meeting the requirements of service backhaul for small cell base stations. RTN 360 can provide large-capacity microwave links for small cell base stations densely deployed in downtown areas.
- RTN 360 is a highly integrated full-outdoor radio transmission product. Its antenna, RF unit, and baseband unit are integrated into an outdoor unit that supports zero-footprint installation, providing carriers with cost-effective full-outdoor radio solutions.

3.2 EUT Identity

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

3.2.1 Board

Name	Description
SLV1SHUA2	2*GE Baseband Board
SLV1A64TA	64GHz Microwave Board

3.2.2 Sub-Assembly

Name	Model	Manufacturer	Description
---	---	---	---

3.3 Technical Description

Characteristics	Description	
Radio System Type	Licence-exempt intentional radiators operation within band 57-64 GHz.	
Equipment Type	#1:	☐ Fixed-operation field disturbance sensors ☒ Other than Fixed-operation field disturbance sensors
	#2:	☐ Indoor ☒ Outdoor
Frequency Range / Operating Channel(s)	TX:	= 59.2 GHz + k * 200 MHz, where k = 0 to 23.
	RX:	= 59.2 GHz + k * 200 MHz, where k = 0 to 23.
Antenna Port(s)	☒ Port 1 (☒ TX & RX, ☐ TX-only, ☐ RX-only)	
Channel Bandwidth	200 MHz	
Modulation Type	QPSK, 16QAM, 32QAM	
TX Output Power	5 dBm (QPSK), 3 dBm (16QAM), 1 dBm (32QAM)	
Emission Designator	176MD7W --- Note: the necessary bandwidth defined in designation of emissions is the worst value from the measured occupied/emission bandwidths for each type of channel bandwidth configuration.	
Power Supply	Type:	☐ AC/DC Adapter, ☒ PoE, ☐ External AC mains, ☐ External DC mains, ☐ Other:
	Model/ID:	(no, due to non standard delivery)
	Nominal Voltage:	-48 VDC
	Voltage Range:	-38.4 to -57.6 VDC

3.3.1 Antenna Assembles

#	Model / ID	Type	Manufacturer	Type	Maximum Gain (G)	Additional Gain (G)	Applied Port(s)
1	(no, due to integral)	☐ External - Dedicated ☐ External - Non standard delivery ☒ Integral	HUBER+SUHNER	flat-plate antenna	37.5 dBi (excluding antenna enclosure) / 36 dBi (including antenna enclosure)	---	Port 1

4 General Test Conditions / Configurations

4.1 EUT Configurations

4.1.1 General

Configuration	Description
Test Antenna Ports	Until otherwise specified, ● All TX tests are performed at all TX antenna ports of the EUT, ● All RX tests are performed at all RX antenna ports of the EUT.
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.

4.1.2 Test Configurations

# EUT Conf.	Test Mode	TX/RX Freq. [GHz]	Power Conf.
QPSK-B	200 MHz, QPSK	59.2	5 dBm
QPSK-M	200 MHz, QPSK	61.4	5 dBm
QPSK-T	200 MHz, QPSK	63.8	5 dBm
16QAM-B	200 MHz, 16QAM	59.2	3 dBm
16QAM-M	200 MHz, 16QAM	61.4	3 dBm
16QAM-T	200 MHz, 16QAM	63.8	3 dBm
32QAM-B	200 MHz, 32QAM	59.2	1 dBm
32QAM-M	200 MHz, 32QAM	61.4	1 dBm
32QAM-T	200 MHz, 32QAM	63.8	1 dBm
CW-B	No modulation	59.2	5 dBm
CW-T	No modulation	63.8	5 dBm

4.2 Test Environments

NOTE: The values used in the test report may be stringent than the declared.

Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
NTNV	Ambient	-48 VDC	Ambient

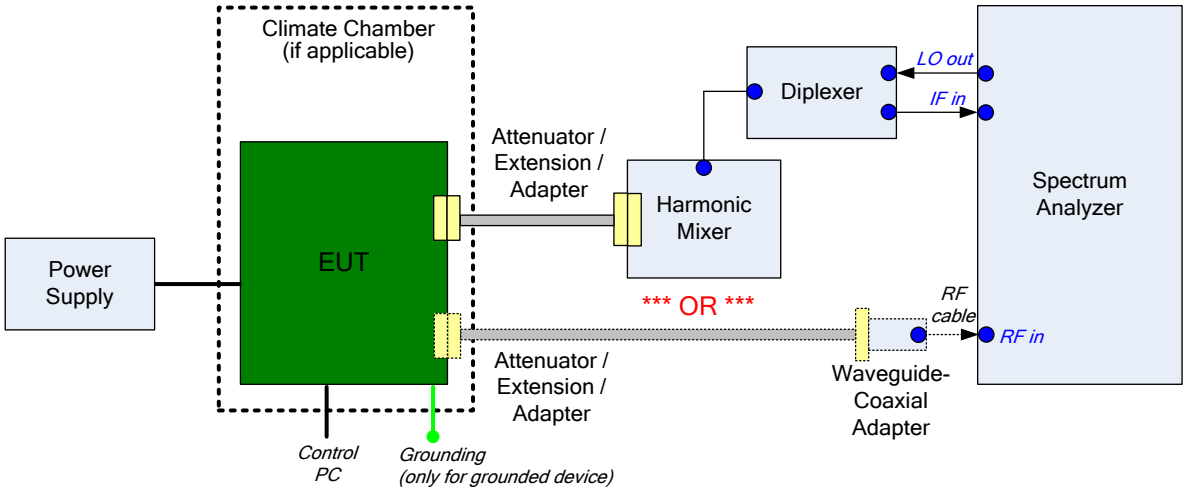
4.3 Auxiliary Facilities Supporting Test

Facility	Manufacturer	Model	Identification	Remark
PoE Adapter	HUAWEI	OptiX RTN PI-AC B20	---	Selected used for power supply.

4.4 Test Setups

4.4.1 Test Setup 1a

The antenna port (waveguide) of the EUT is connected to the Spectrum Analyzer per appropriate attenuator/extension/adapter. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements. Measure the fundamental emissions using the Spectrum Analyzer.

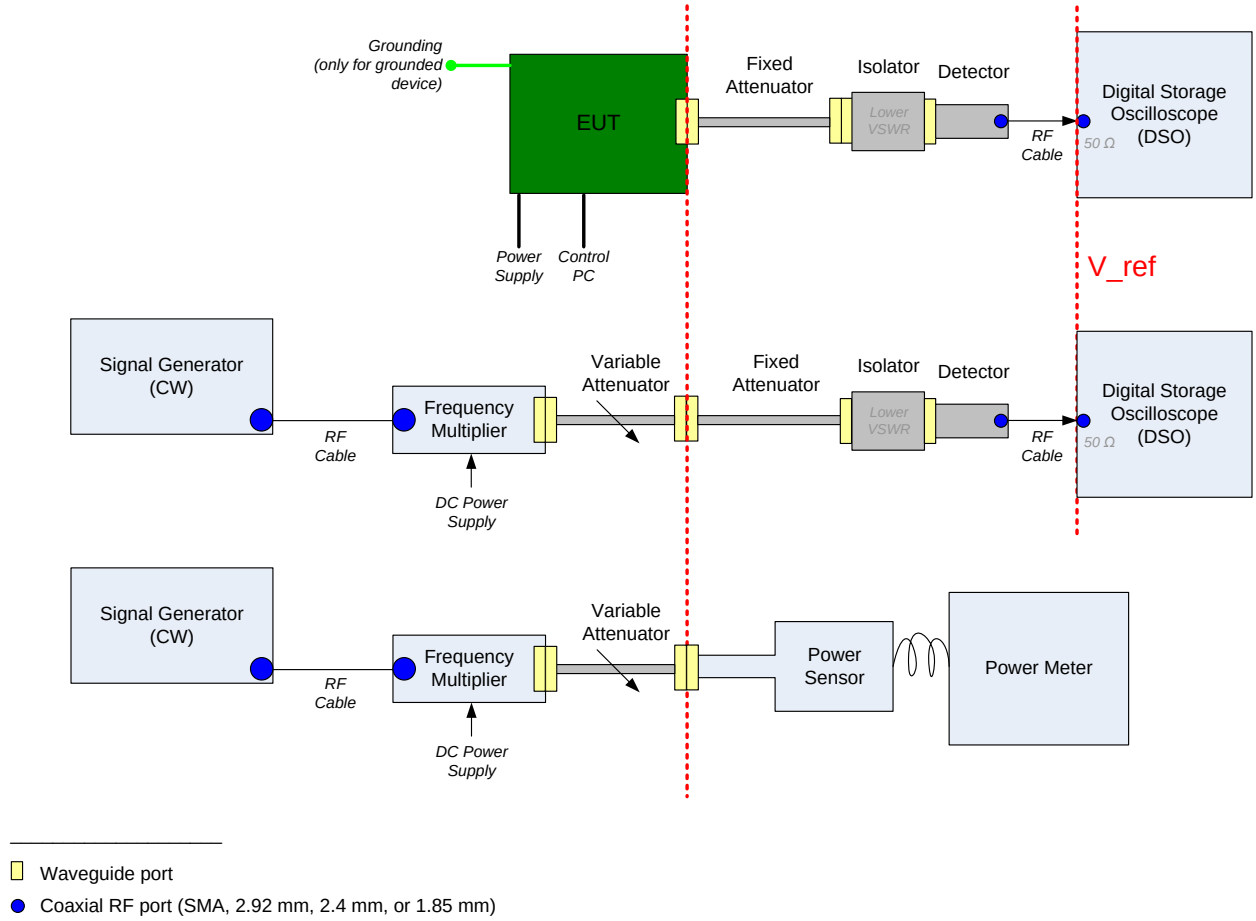


4.4.2 Test Setup 1b

The antenna port (waveguide) of the EUT is connected to the 50 Ω input of the Digital Storage Oscilloscope (DSO), per Fixed Attenuator, Isolator, and Detector. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.

Record the average and peak voltages (V_ref) from the DSO. Disconnect the EUT from the RF input port of the instrumentation system, and then connect an mm-wave Signal Generator system (CW) to the RF input port of the instrumentation system via a Variable Attenuator. Adjust the frequency of the mm-wave Signal Generator system to the operating frequency of the EUT, and adjust the amplitude of the mm-wave Signal Generator system and/or the Variable Attenuator such that the DSO indicates a voltage equal to the peak or average voltage V_ref.

Disconnect the Variable Attenuator from the RF input port of the instrumentation system. Without changing any settings, connect the Variable Attenuator to a wideband mm-wave Power Meter system. Measure and note the power as the peak or average (respectively) conducted output power of the EUT.



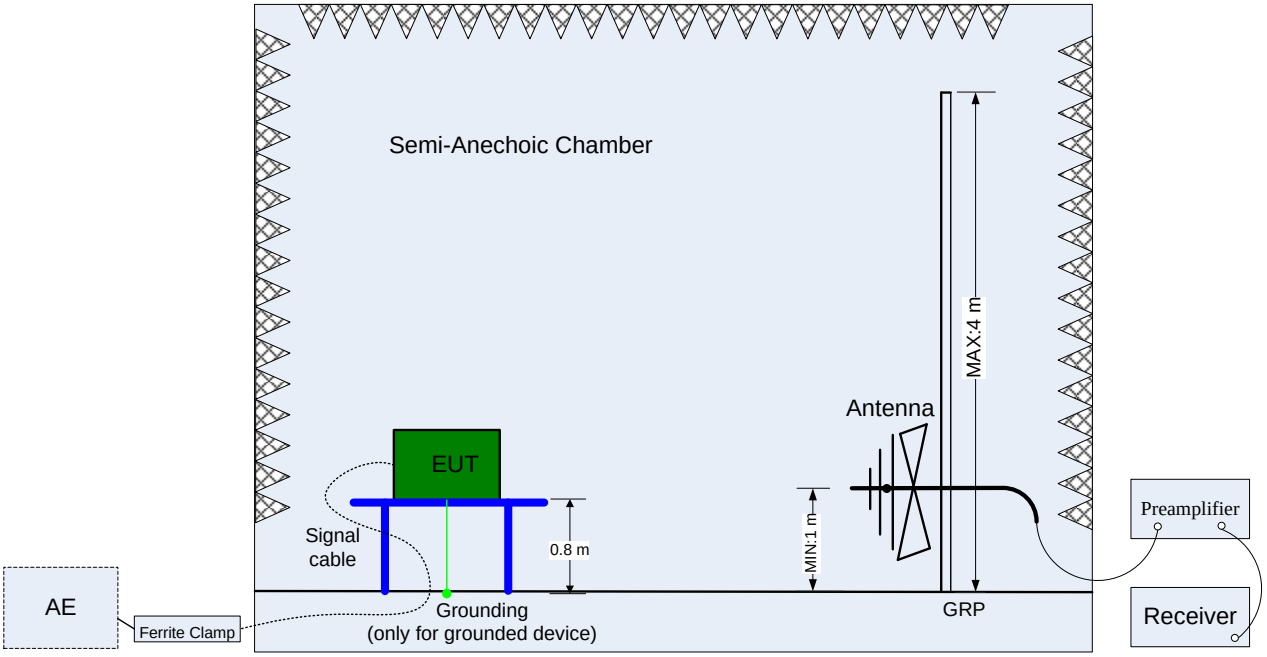
Waveguide port

Coaxial RF port (SMA, 2.92 mm, 2.4 mm, or 1.85 mm)

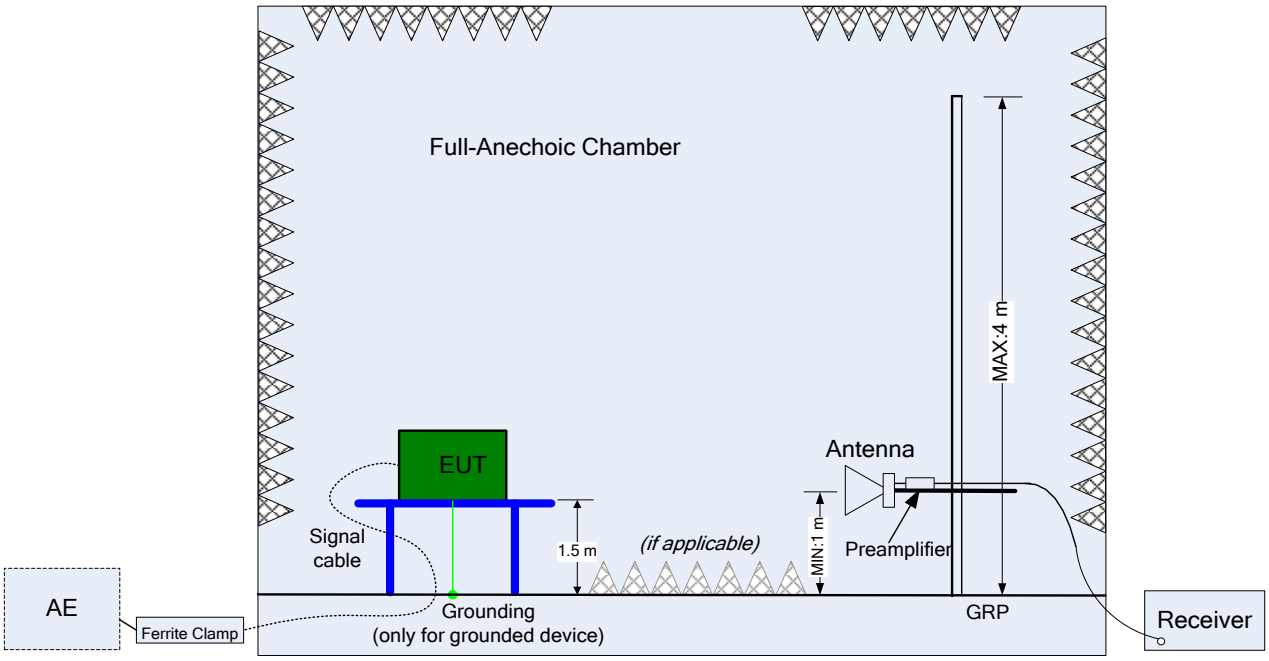
4.4.3 Test Setup 2

The test site semi-anechoic chamber for below 1 GHz met the requirement of NSA tolerance 4 dB according to the standard ANSI C63.4. The test distance is 3 m. The test site semi-/full-anechoic chamber for above 1 GHz test met the requirement of SVSWR tolerance 6 dB in accordance with the standard ANSI C63.4. The test distance was 3 m. The setup is according to ANSI C63.10 and ANSI C63.4.

The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).



(Below 1 GHz)

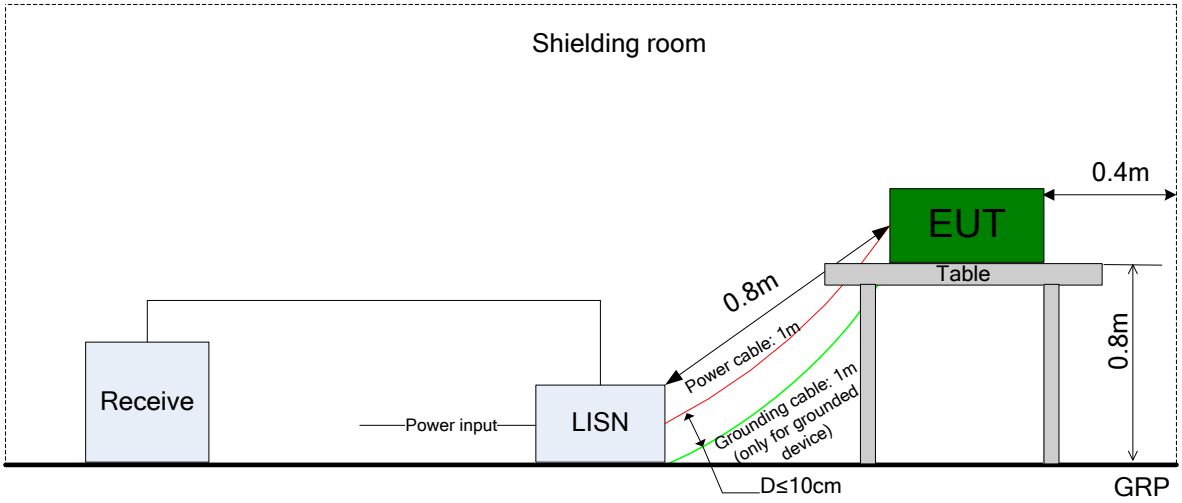


(Above 1 GHz)

4.4.4 Test Setup 3

The mains cable of the EUT (maybe per AC/DC Adapter or equivalent) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.



4.5 Test Conditions

Test Case		Test Conditions	
Bandwidth	Emission Bandwidth (6 dB)	Test Method	ANSI C63.10-2013 §9.3. Note: The compliance in the report is based on conducted measurement.
		Test Env.	NTNV
		Test Setup	Test Seup 1a
		EUT Conf.	QPSK-B, QPSK-M, QPSK-T, 16QAM-B, 16QAM-M, 16QAM-T, 32QAM-B, 32QAM-M, 32QAM-T
	Occupied Bandwidth (99 %)	Test Method	ANSI C63.10-2013 §6.9.3. Note: The compliance in the report is based on conducted measurement.
		Test Env.	NTNV
		Test Setup	Test Seup 1a
		EUT Conf.	QPSK-B, QPSK-M, QPSK-T, 16QAM-B, 16QAM-M, 16QAM-T, 32QAM-B, 32QAM-M, 32QAM-T
In-Band Emission		Test Method	ANSI C63.10-2013 §9.11, §9.4 to §9.7. Note: The compliance of power density or EIRP in the report is based on conducted output power measurement, and equation calculations.
		Test Env.	NTNV
		Test Setup	Test Seup 1b
		EUT Conf.	QPSK-B, QPSK-M, QPSK-T, 16QAM-B, 16QAM-M, 16QAM-T, 32QAM-B, 32QAM-M, 32QAM-T
Spurious Emissions		Test Method	ANSI C63.10-2013 §9.12, §6.3 to §6.6. Note 1: The compliance of field strength (below 40 GHz) in the report is based on radiated measurement; and the power density (above 40 GHz) is based on radiated EIRP power measurement, and equation calculations. Note 2: For the field strength (in dBμV/m) measurement below 40 GHz, the Receiver/Spectrum analyzer's reading (in dBμV) is corrected by cable loss (in dB), test antenna factor (in dB/m) and, if necessary, the distance extrapolation factor (in dB) according to ANSI C63.10-2013 §5.3.
		Test Env.	NTNV
		Test Setup	Test Seup 2
		EUT Conf.	The whole testing range is from "9 kHz to 200 GHz" is divided into following several parts according to the test site settings for radiated measurement.
			9k-150kHz: Worst Case (QPSK-M)
			150k-30MHz: Worst Case (QPSK-M)
			30M-1GHz: Worst Case (QPSK-M)
			1G-40GHz: Worst Case (QPSK-M)

Test Case	Test Conditions		
		40 G-50 GHz	Worst Case (QPSK-M)
		50 G-75 GHz	Worst Case (QPSK-M)
		75G-110 GHz	Worst Case (QPSK-M)
		110G-140 GHz	Worst Case (QPSK-M)
		140G-200 GHz	Worst Case (QPSK-M)
Frequency Stability	Test Method	FCC: ANSI C63.10-2013 §9.14. IC: RSS-Gen §8.11,§6.11. Note: The compliance in the report is based on conducted measurement.	
	Test Env.	FCC: ● ambient temperature & (85/100/115 % * nominal voltage); and, ● nominal voltage & (-20/-10/0/+10/+20/+30/+40/+50 °C) IC: ● +20 °C & (85/100/115% * nominal voltage); and, ● nominal voltage & (-20/+20/+50 °C)	
	Test Setup	Test Setup 1a	
	EUT Conf.	FCC: QPSK-B, QPSK-T, 16QAM-B, 16QAM-T, 32QAM-B, 32QAM-T	
AC Power Line Conducted Emissions	Test Method	ANSI C63.10-2013 6.7.	
	Test Env.	NTNV	
	Test Setup	Test Setup 3	
	EUT Conf.	Worst Case (QPSK-M)	

5 Main Test Instruments

NOTE 1: NCR = No calibration required, VOU = Verified on use.

NOTE 2: Unless otherwise specified, the calibration intervals for test instruments were Annual (per year). The other intervals, if applicable, are marked with (##y), which denotes ## years calibration interval.

SYBH(R)02355539EB-1:

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1a				
Spectrum Analyzer	R&S	FSU67	101159	2016-05-27
Power Supply (AC)	Chroma	6530	653000008611	2016-10-20 (2y)
Power Supply (DC)	Chroma	62012P-80-60	62012PD01403	2016-10-20 (2y)
Climate Chamber	ESPEC	EW0470S	12113066	2016-11-08
Test Setup 1b				
Signal Generator	Agilent	E8257D	MY51110541	2016-06-02
Digital Storage Oscilloscope	Tektronix	TDS7154B	B020436	2016-07-06
Power Sensor (50-75GHz)	Agilent	V8486A	MY54320001	2016-08-14 (2y)
Power Meter Unit	Agilent	E4417A	GB41292113	2017-02-28
Millimeter-wave Multipliers (50-75GHz)	OML	S15MS-AG	140909-1	VOU
Millimeter-wave Detector (50-75GHz)	Millitech	DET-15-RPFW0 (DET-15-RPFWI)	049 (061)	VOU
Millimeter-wave Isolator (50-75GHz)	Millitech	FBI-15-RSES0	1855	VOU
Variable Millimeter-wave Attenuator (50-75GHz)	FLANN	25110	218281	VOU
Test Setup 2				
Test Software	TOYO	EP5	V5.5	NCR
Chamber_NSA	Albatross	3m chamber	---	2016-06-28 (3y)
Chamber_SVSWR	Albatross	3m chamber	---	2016-06-28 (3y)
EMI test receiver	Agilent	N9038A	MY52260169	2016-10-26
Spectrum analyser	Agilent	N9010A	MY52220816	2017-01-10
Bilog antenna	TESEQ	CBL 6112B	35238	2017-11-28 (2y)
Bilog antenna	TESEQ	CBL 6112B	35239	2017-12-12 (2y)
Horn antenna (1-18GHz)	SWARZBECK	BBHA 9120D	1077	2017-11-28 (2y)
Horn antenna (1-18GHz)	SWARZBECK	BBHA 9120D	1078	2017-11-07 (2y)
Horn antenna (18-26.5GHz)	ETS	3160-09	00114886	2016-05-07 (2y)
Horn antenna (18-26.5GHz)	ETS	3160-09	00117544	2017-11-06 (2y)
Horn antenna (26.5-40GHz)	ETS	3160-10	00144745	2017-11-28 (2y)
Spectrum Analyzer	Agilent	E4440A	MY49420179	2017-02-28
Horn antenna (40-60GHz)	OML	M19RH	A130913826	VOU
Horn antenna (50-75GHz)	OML	M15RH	A130913825	VOU

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Horn antenna (75-110GHz)	OML	M10RH	A130913824	VOU
Horn antenna (110-170GHz)	OML	M06RH	A130913823	VOU
Horn antenna (140-220GHz)	OML	M05RH	A130913822	VOU
Harmonic mixer (40-60GHz)	Farran	WHMB-19-0002	FTL 9039	VOU
Harmonic mixer (50-75GHz)	Farran	WHMB-15-0002	FTL 9040	VOU
Harmonic mixer (75-110GHz)	Farran	WHMB-10-0002	FTL 9042	VOU
Harmonic mixer (110-170GHz)	Farran	WHMB-06-0002	FTL 9043	VOU
Harmonic mixer (140-220GHz)	Farran	WHMB-05-0002	FTL 9044	VOU
Test Setup 3				
Test Software	R&S	ES-K1	V1.7.1	NCR
EMI Test receiver	R&S	ESCS30	830245/018	2017-01-10
Artificial Mains Network	R&S	ENV4200	100063	2017-01-10

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Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 2				
Test Software	TOYO	EP5	V5.5	NCR
Chamber_NSA	Albatross	3m chamber	---	2016-06-28 (3y)
Chamber_SVSWR	Albatross	3m chamber	---	2016-06-28 (3y)
EMI test receiver	Agilent	N9038A	MY52260169	2016-10-26
Spectrum analyser	Agilent	N9010A	MY52220816	2017-01-10
Bilog antenna	TESEQ	CBL 6112B	35238	2017-11-28 (2y)
Bilog antenna	TESEQ	CBL 6112B	35239	2017-12-12 (2y)
Horn antenna (1-18GHz)	SWARZBECK	BBHA 9120D	1077	2017-11-28 (2y)
Horn antenna (1-18GHz)	SWARZBECK	BBHA 9120D	1078	2017-11-07 (2y)
Horn antenna (18-26.5GHz)	ETS	3160-09	00114886	2018-05-06 (2y)
Horn antenna (18-26.5GHz)	ETS	3160-09	00117544	2017-11-06 (2y)
Horn antenna (26.5-40GHz)	ETS	3160-10	00144745	2017-11-28 (2y)
Spectrum Analyzer	Agilent	E4440A	MY49420179	2017-02-28
Horn antenna (40-60GHz)	OML	M19RH	A130913826	VOU
Horn antenna (50-75GHz)	OML	M15RH	A130913825	VOU
Horn antenna (75-110GHz)	OML	M10RH	A130913824	VOU
Horn antenna (110-170GHz)	OML	M06RH	A130913823	VOU
Horn antenna (140-220GHz)	OML	M05RH	A130913822	VOU
Harmonic mixer (40-60GHz)	Farran	WHMB-19-0002	FTL 9039	VOU
Harmonic mixer (50-75GHz)	Farran	WHMB-15-0002	FTL 9040	VOU
Harmonic mixer (75-110GHz)	Farran	WHMB-10-0002	FTL 9042	VOU
Harmonic mixer (110-170GHz)	Farran	WHMB-06-0002	FTL 9043	VOU
Harmonic mixer (140-220GHz)	Farran	WHMB-05-0002	FTL 9044	VOU

6 Measurement Uncertainty

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

Test Item		Extended Uncertainty
Spurious Emissions	Field Strength [dBμV/m]	U = 4.7 dB (30 MHz-1 GHz); k=2 U = 4.1 dB (1 GHz-18 GHz); k=2 U = 3.6 dB (18 GHz-26.5 GHz); k=2 U = 3.8 dB (26.5 GHz-40 GHz); k=2
AC Power Line Conducted Emissions	Disturbance voltage [dBμV]	U = 3.3 dB; k=2
Frequency Stability	Temperature [°C]	U = 0.3 °C; k=2
	Supply Voltages [VAC]	U = 0.15 %; k=2
	Supply Frequency [Hz]	U = 0.03 %; k=2
	Supply Voltages [VDC]	U = 0.02 %; k=2

Annex A Definitions and Abbreviations

Definitions and Abbreviations	Description
CEILING{x}	The smallest integer not less than x. For example: CEILING{3} = 3, CEILING{3.2} = 4, CEILING{3.8} = 4.
EIRP	Equivalent isotropically radiated power
G	Directional antenna gain in dBi.
IF{'bool', x, y}	If the condition 'bool' is the case, then use x, otherwise use y.
MAX{x, y}	The maximum between x and y.
MIN{x, y}	The minimum between x and y.
RX	Receiving or Receiver.
TX	Transmission or Transmitter.

END