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检测
TESTING
CNAS L0310



RF Report

Product Name: Remote Radio Unit

Product Model: RRU3278

Report Number: SYBH(R)03039807EB-1

FCC ID: QISRRU3278

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,
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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.

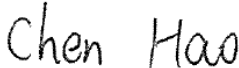


Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name: Remote Radio Unit
Product Model: RRU3278

Date of Receipt Sample: 2017-05-02
Start Date of Test: 2017-05-10
End Date of Test: 2017-05-15

Test Result: Pass

Approved by Senior Engineer:	2017-05-16	Ren Huasheng	
	Date	Name	Signature

Prepared by:	2017-05-16	Chen Hao	
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1	---	First report.

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1 General Information

1.1 Applied Standard

Applied Rules/Standards: 47 CFR FCC Part 2 (10-1-14 Edition)
47 CFR FCC Part 90 (10-1-14 Edition)

(Accredited by)

☒ CNAS, ☒ A2LA
☒ CNAS, ☒ A2LA

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

1.3 Test Environment Condition

Ambient Temperature: 15 to 30 °C
Ambient Relative Humidity: 20 to 85 %
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 IC, 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).

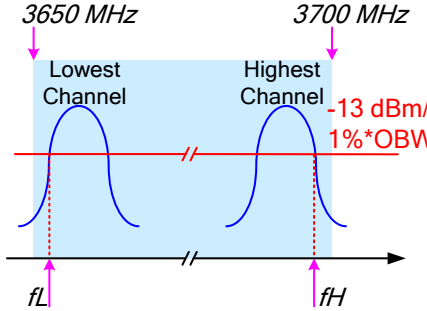
NOTE 3: In the following table(s), the “NA” denotes “Not applicable”, the “NT” denotes “Not tested”, and “NC” denotes “No conclusion”.

2.1 WBS 3.7G Band (3650-3700 MHz)

2.1.1 Measurement Technical Requirements

The test results in the following table refer to the document of “SYBH(R)03039807EB-1A”:

Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
Transmitter Output Power	\$2.1046, §90.1321(a)	RSS-Gen,§6.12; RSS-197,§5.6	FCC	Base Station / Fixed Station	- EIRP Power ≤ 25 W/25 MHz. - Peak EIRP PD ≤ 1 W/1 MHz.	Annex A	Pass	TL1
				Mobile Station / Portable Station	- EIRP Power ≤ 1 W/25 MHz. - Peak EIRP PD ≤ 40 mW/1 MHz.			
			IC	Non-Mobile Station / Non-Portable Station	- Peak Conducted PD ≤ 1 W/1 MHz. - Maximum EIRP PD ≤ 1 W/1 MHz - Antenna Limit (refer to SRSP-303.65)			
				Mobile Station (/Portable Station)	Peak EIRP PD ≤ 40 mW/1 MHz.			
Bandwidth	\$2.1049	RSS-Gen,§6.6	FCC	- OBW: No limit. - EBW: No limit		Annex B	Pass	TL1
			IC	OBW: No limit.				

Test Item	FCC Rule	IC Rule	Requirements		Test Result	Verdict	Test Location
Band Edges Compliance	§2.1051, §90.1323	RSS-Gen, §6.13; RSS-197, §5.7	FCC	≤ -13 dBm, in 1 MHz range (integrated with RBW $\geq 1\% \cdot \text{EBW}$) outside 3650-3700 MHz.	Annex C	Pass	TL1
			IC	≤ -13 dBm, in 1 MHz range (integrated with RBW $\geq 1\% \cdot \text{OBW}$) outside 3650-3700 MHz.			
Emission Mask	§2.1051, §90.210	NA					
Spurious Emission at Antenna Terminals	§2.1051, §90.1323	RSS-Gen, §6.13; RSS-197, §5.7		≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside range from (3650-1) to (3700+1) MHz.	Annex D	Pass	TL1
Field Strength of Spurious Radiation / Radiated Spurious Emissions	§2.1053, §90.1323	RSS-Gen, §6.13; RSS-197, §5.7		≤ -13 dBm/1 MHz.	Annex E	Pass	TL1
Frequency Stability	§2.1055	RSS-Gen, §6.11; RSS-197, §5.3	FCC	No limit.	Annex F	Pass	TL1
			IC	- Step 1: f(offset): no limit. - Step 2: $f_L - f(\text{offset}) > 3650$ MHz, $f_H + f(\text{offset}) < 3700$ MHz.  - Test conditions for Step 1: (1) NV, -30°C/+20°C/+50°C. (2) +20°C,			

Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location
			$\pm 15\% \cdot NV$. Test conditions for Step 2: NTNV.			
Receiver Spurious Emissions	---	RSS-Gen, §5; RSS-Gen, §7; RSS-197, §5.8	- Radiated limit: RSS-Gen, §7.1.2 Receiver Radiated Limits. - Conducted limit: ≤ -57 dBm/120 kHz (CISPR-QP), from max (local oscillator, intermediate frequency, carrier frequency, 30 MHz) to 1000 MHz; and ≤ -53 dBm/1 MHz (AV), from 1 GHz to min (max (5 * highest tunable frequency, 5 * highest local oscillator frequency), 40GHz).	Annex G	---	---

2.1.2 Non-measurement Technical Requirements

Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
Frequency Plan	§90.1301	RSS-197, §2.3	3650-(3675)-3700 MHz.	See technical specification description.	Comply
Modulation Characteristics	§2.1047	RSS-197, §5.1	Digital modulation.	See technical specification description.	Comply
Channel Bandwidth	---	RSS-197, §5.2	ChBW ≥ 1 MHz.	See technical specification description.	Comply
Contention-based Protocol	§90.1305, §90.7, §90.1319(b), KDB552295	RSS-197, §5.4	All stations operating in this band should employ a contention-based protocol.	The type of protocol implemented is LBT.	Comply
Operating Range Limitation	§90.1319(c)	---	- Equipment incorporating an unrestricted contention-based protocol may operate throughout the whole 3650-3700 MHz. (FCC auth) - Equipment incorporating a restricted contention-based protocol shall only tune over the 3650-3675 MHz. (TCB PBA)	Within the operating range	Comply
Operating Restriction	§90.1333	RSS-197, §5.5	Portable and mobile stations (including those operating in mobile-to-mobile	Not Applicable	Comply



Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
for Mobile and Portable Equipment			mode) are only permitted to transmit if they have first received and decoded an enabling signal transmitted by a base station.		

3 Description of the Equipment under Test (EUT)

3.1 General Description

The DBS3900 LTE TDD, a future-oriented E-UTRAN NodeB (eNodeB) product launched by Huawei, is a distributed eNodeB supporting TDD LTE. The DBS3900 LTE TDD fully exploits Huawei platform resources and uses a variety of technologies.

The RRU3278 is a type of radio remote unit. It implements conversion between baseband signals, IF signals, and RF signals, demodulates the received radio signals, and modulates the signals to be transmitted, and amplifies the transmit power of the signals.

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	Hardware Version	Description
WD5BPRX8DXM	Ver.A	TRX unit
WD5APRP8K9A	Ver.A	DC unit

3.2.2 Sub-Assembly

Name	Model	Manufacturer	Description
AC/DC converter	DC	Huawei	---
Optical module	---	Huawei	---

3.3 Technical Specification

3.3.1 General Technical Description

Characteristics	Description	
Radio System Type	☐ GSM (GO) ☐ UMTS (UO) ☒ LTE (LO) ☐ CDMA (CO) ☐ GSM & UMTS (GU) ☐ GSM & LTE (GL) ☐ GSM & UMTS & LTE (GUL) ☐ CDMA & LTE (CL) ☐ P2P	
Equipment Type	Type #1	☒ Base Station Equipment ☐ CPE (Customer Premises Equipment) Equipment ☐ Subscriber Equipment (User Equipment) ☐ Fixed Point-to-Point Equipment
	Type #2	☒ Fixed ☐ Mobile ☐ Portable
	Type #3	☐ Indoor ☒ Outdoor
Frequency Range (Transmission (TX) and Receiving (RX))	#1	TX: 3650 to 3700 MHz RX: 3650 to 3700 MHz
TX and RX Antenna Ports	TX & RX port: 8, TX-only port: 0, RX-only port: 0	
Multiple Carrier Supported	3	
Maximum RF Bandwidth	50 MHz	
TX Output Power	Max. 1.25 W (per antenna port) Max. 8*1.25 W (8 antenna ports)	
Supported Channel Bandwidth	10 MHz, 20 MHz	
Modulation Type	LTE system:	Base-band: QPSK, 16QAM, 64QAM Carrier: OFDM/OFDMA

Characteristics	Description	
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	LTE system:	20M0D9W
Power Supply	Type:	☐ External AC mains, ☒ External DC mains, ☐ AC/DC Adapter, ☐ Powered over Ethernet (PoE)
	Nominal Voltage, Input to EUT:	-48 VDC
	Voltage Range, Input to EUT:	-36 to -57 VDC

3.3.2 Transmit Power Description

Carrier configuration	Transmit power (per antenna port)
1L_20M	1*27 dBm
2L_20M_10M	1*27 dBm + 1*24 dBm
2L_20M_20M	2*27 dBm
3L_20M_20M_10M	2*27 dBm + 1*24 dBm
Note: in the table, the L means LTE.	

3.3.3 Antenna Assemblies

NOTE 1: For the “external antenna” in the report:

- (1) It refers to the antenna external to the equipment, using an antenna connector with a cable and which has been designed or developed for one or more specific types of equipment.
- (2) It is the combination of external antenna and radio equipment that is expected to be compliant with the regulations. If the external antenna is not supplied by the equipment manufacturer, and also will not be equipped on sale, a typical or recommended configuration will be considered during lab testing. However, when the radio equipment is put into service, the practical maximum antenna gain may exceed the value as described; if this is the case, the combination of the practical output power (may be degraded) and the practical antenna gain should NOT exceed the required ERP/EIRP limit.

NOTE 2: The “integral antenna” in the report:

- (1) It refers to the antenna designed as a fixed part of the equipment, without the use of an external connector and which cannot be disconnected from the equipment by a user with the intent to connect another antenna.
- (2) For the testing purpose, a temporary RF connector may be provided.



NOTE 3: The antenna gain is the combination of basic gain (directional gain, G) and, if applicable, additional beam-forming gain (Y).

Characteristics	Description
Antenna Type	☒ External ☐ Integral

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 ONLY performed at the main TX antenna port (e.g. TRXA, TXA or similar) of the EUT, and - All RX tests are ONLY performed at the main RX antenna port (e.g. TRXA, RXB or similar) 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 Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

Test Mode	Test Modes Description
LTE/TM1.1	LTE system, 3GPP TS 36.141 clause 6.1.1, E-TM 1.1
LTE/TM1.2	LTE system, 3GPP TS 36.141 clause 6.1.1, E-TM 1.2

4.1.3 Test Configurations

EUT Conf.	RF Ch.	Carrier Conf. Description	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
1L_20M_B_TM1	B	1L*0.5W	3660	---	20	27	TM1.1
1L_20M_M_TM1	M	1L*0.5W	3675	---	20	27	TM1.1
1L_20M_T_TM1	T	1L*0.5W	3690	---	20	27	TM1.1
2L_20M_10M_M_T M1	M	1L*0.5W+1L*0.25W	3660,3695	---	20,10	27,24	TM1.1
2L_20M_20M_B_T M1	B	2L*0.5W	3660,3680	---	20,20	27,27	TM1.1
2L_20M_20M_T_T M1	T	2L*0.5W	3670,3690	---	20,20	27,27	TM1.1
3L_20M_20M_10M _T_TM1	M	2L*0.5W+1L*0.25W	3660,3680, 3695	---	20,20,10	2*24,27	TM1.1

4.2 Test Environments

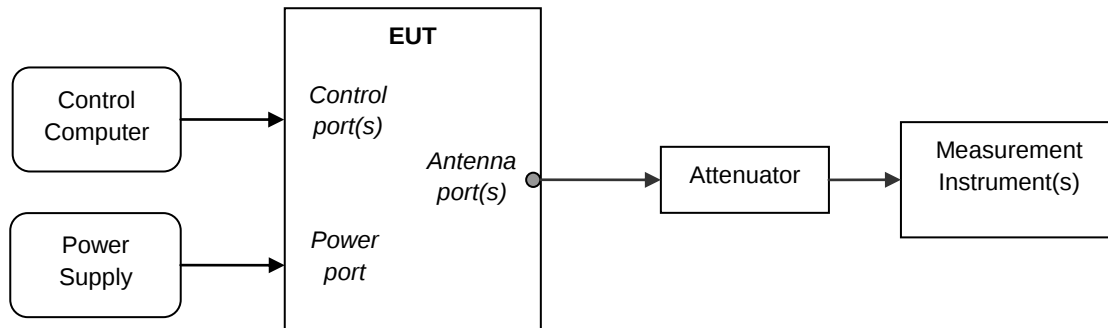
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate (See clause 1.3)	Ambient	---	Ambient
Rated Voltage	---	-48 VDC	---

4.3 Auxiliary Facilities Supporting Test

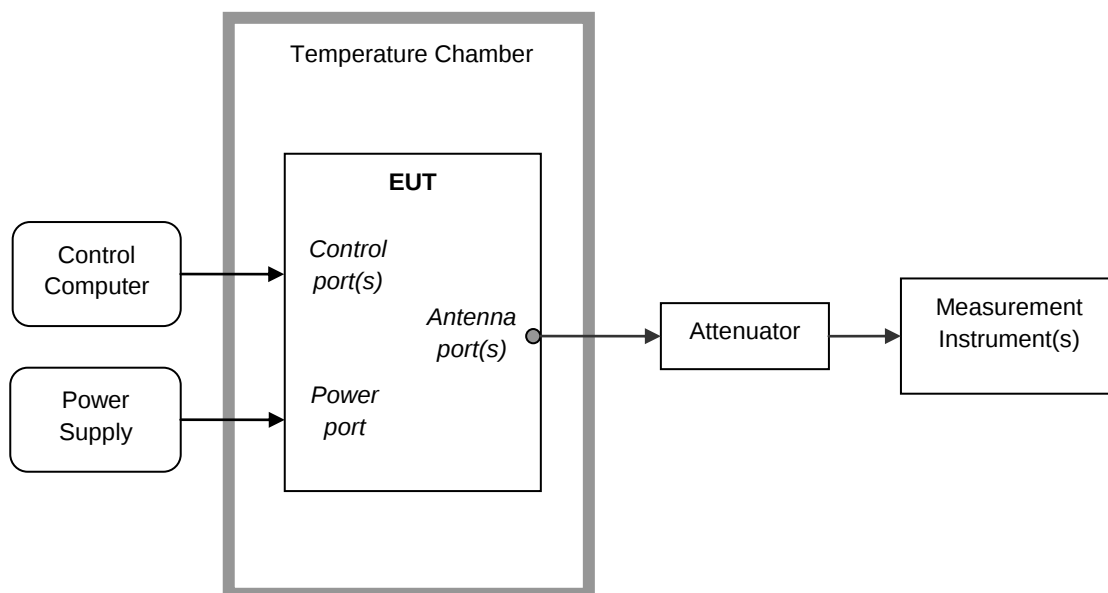
Facility	Manufacturer	Model	Identification	Remark
Control Computer	Lenovo	M8500t	SA18444403	Used to control the EUT.
UMPT	HUAWEI	UMPT	210305410F3000 052	Universal Main Processing & Transmission unit
UBBP	HUAWEI	UBBP	022HEM10EB00 0231	Baseband Processing and Interface Unit

4.4 Test Setups

4.4.1 Test Setup 1



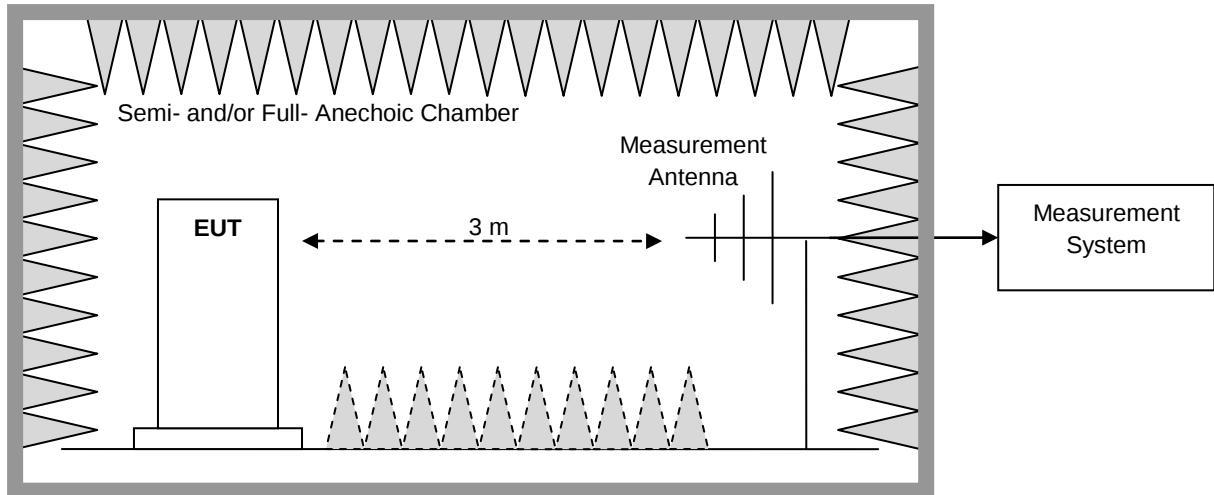
4.4.2 Test Setup 2



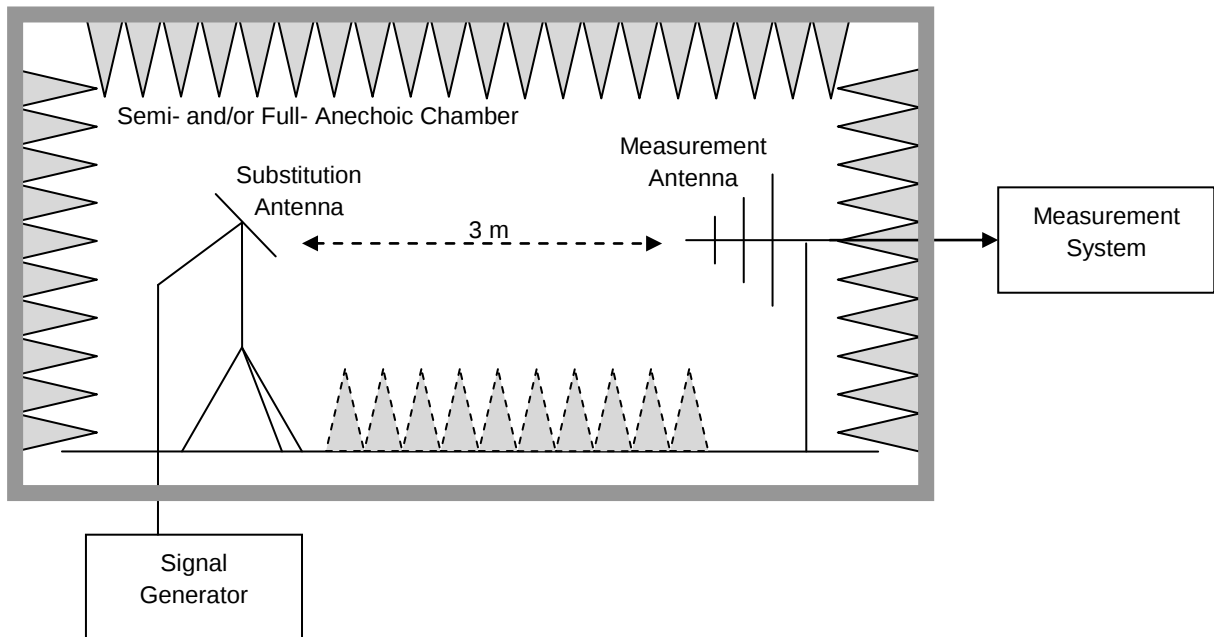
4.4.3 Test Setup 3

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

4.4.3.1 Step 1: Pre-test



4.4.3.2 Step 2: Substitution method to verify the maximum ERP



4.5 Test Conditions

Test Case		Test Conditions	
Transmitter Output Power	Channel Power, Total	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_20M_B_TM1, 1L_20M_M_TM1, 1L_20M_T_TM1, 2L_20M_10M_M_TM1 ,2L_20M_20M_B_TM1, 2L_20M_20M_T_TM1, 3L_20M_20M_10M_M_TM1
	Power Spectral Density (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_20M_B_TM1, 1L_20M_M_TM1, 1L_20M_T_TM1, 2L_20M_10M_M_TM1 ,2L_20M_20M_B_TM1, 2L_20M_20M_T_TM1, 3L_20M_20M_10M_M_TM1
	Peak-to-Average Ratio (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_20M_B_TM1, 1L_20M_M_TM1, 1L_20M_T_TM1,
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_20M_B_TM1, 1L_20M_M_TM1, 1L_20M_T_TM1,
	Emission Bandwidth (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	---
Band Edges Compliance / Emission Mask		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_20M_B_TM1, 1L_20M_M_TM1, 1L_20M_T_TM1, 2L_20M_10M_M_TM1 ,2L_20M_20M_B_TM1, 2L_20M_20M_T_TM1, 3L_20M_20M_10M_M_TM1
Spurious Emission at Antenna Terminals		Test Type	☒ Conducted ☐ Radiated (go to test case of Field Strength of Spurious Radiation / Radiated Spurious Emissions) NOTE: According to FCC §2.1053 and KDB 971168 §6.1&§5.8, in the cases of the EUTs that are portable or hand-held devices utilizing one or more integral transmit antennas, measurements cannot be performed in a conducted measurement configuration, it becomes necessary to perform the described compliance measurements in a radiated test arrangement.
		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_20M_B_TM1, 1L_20M_M_TM1, 1L_20M_T_TM1, 3L_20M_20M_10M_M_TM1

Test Case		Test Conditions	
Field Strength of Spurious Radiation / Radiated Spurious Emissions		Test Type	☐ Field Strength of Spurious Radiation ☒ Radiated Spurious Emissions NOTE: According to FCC §2.1053 and KDB 971168, when antenna-port conducted measurements (i.e. Spurious Emission at Antenna Terminals measurement) are performed to demonstrate compliance to the applicable unwanted emission limits, a separate radiated measurement (i.e. this Field Strength of Spurious Radiation measurement) is required to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation (, and with the transmit antenna port(s) terminated). Note that when radiated measurements for spurious emissions at antenna terminals are performed to demonstrate compliance to the unwanted emission limits (e.g., an EUT with integral transmit antenna), the field strength of spurious radiation measurement is not required.
		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 3
		EUT Conf.	3L_20M_20M_10M_M_TM1 NOTE: If applicable, the EUT Conf. that has maximum power density (based on the equivalent power level) is selected.
Frequency Stability	Frequency Error	Test Env.	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) 85%, 100% and 115% of Rated Voltage at Ambient Climate.
		Test Setup	Test Seup 2
		EUT Conf.	1L_20M_B_TM1, 1L_20M_T_TM1, NOTE: A representative EUT Conf. was selected since the un-modulation carrier configuration was required by the standards/rules.
	Frequency Range (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 2
		EUT Conf.	---
Receiver Spurious Emissions		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	---

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.

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1				
Spectrum Analyzer	Agilent	N9030A	MY49431033	2018-02-13
Signal Generator	Agilent	E8257D	MY51110541	2018-04-19
Climate Chamber	ESPEC	EW0470S	12113066	2017-08-10
Test Setup 2				
EMI test receiver	R&S	ESU40	100144	2018-03-05
Broadband Antenna	SCHAFFNER	CBL6112B	2941	2018-08-23
Horn antenna	ETS	ETS 3160-09	053215-21876	2018-03-25(2Y)
Horn antenna	R&S	HF906	359287/005	2018-02-26(2Y)
Horn antenna	EMCO	3116	00031541	2019-04-20(2Y)

6 Measurement Uncertainty

For a 95% confidence level ($k = 2$), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item		Extended Uncertainty
Transmitter Output Power	Power [dBm]	U = 0.39 dB
Bandwidth	Magnitude [%]	U = 0.2%
Band Edge Compliance	Disturbance Power [dBm]	U = 2.0 dB
Spurious Emissions, Conducted	Disturbance Power [dBm]	U = 2.0 dB
Field Strength of Spurious Radiation / Radiated Spurious Emissions	Power [dBm] / Field Strength [dB μ V/m]	For 3 m Chamber: U = 4.15 dB (30 MHz-1 GHz) U = 3.64 dB (1 GHz-18 GHz) U = 3.26 dB (18 GHz-26.5 GHz) U = 3.83 dB (26.5 GHz-40 GHz) For 10 m Chamber: U = 4.8 dB (30MHz to 1GHz) U = 4.3 dB (1 GHz to 26.5GHz)
Frequency Stability	Frequency Accuracy [ppm]	U = 0.21 ppm

END