

TEST REPORT

Applicant: FCC :YT Innovations LLC
IC: YT INNOVATIONS LLC
FCC:209-34 Northern Blvd PMC 1001, Bayside, New York, United States, 11361
Address: IC: 8425 Abingdon Rd, Kew gardens, NY 11415, United States Of America

Product Name: Cellular Multisensor Pro

FCC ID: 2BDJB-MS300

IC: 35001-MS300

HVIN: MS300

Standard(s): 47 CFR Part 2, 47 CFR Part 22, Subpart H
47 CFR Part 24, Subpart E ,47 CFR Part 27
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RSS-133 Issue 7, July 24, 2024
RSS-139 Issue 4, Amendment October, 2022*
RSS-Gen, Issue 5, February 2021 Amendment 2
ANSI C63.26-2015

Report Number: 2602T23317E-RF-00A

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The above device has been tested and found compliant with the requirement of the relevant standards by Bay Area Compliance Laboratories Corp. (Dongguan).

Alice Tan

Reviewed By: Alice Tan

Title: RF Engineer

Pedro Yun

Approved By: Pedro Yun

Title: RF Supervisor

Bay Area Compliance Laboratories Corp. (Dongguan)
No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China

Tel: +86-769-86858888

Fax: +86-769-86858891

www.baclcorp.com.cn

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2602T23317E-RF-00A	Original Report	2026/7/16

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	Cellular Multisensor Pro
EUT Model:	MS300
Operation Bands and modes:	LTE: Band 2/4/5/12/66
Modulation Type:	QPSK, 16QAM
Rated Input Voltage:	3.7Vdc from battery or 5Vdc from USB Port
Serial Number:	RF Conducted: 3MR3-3 RF Radiated Test: 3MR3-4
EUT Received Date:	2026/5/27
EUT Received Status:	Good
Note: 1.16QAM is supported maximum RB27 only.	

1.2 Accessory Information

Accessory Description	Manufacturer	Model	Parameters
/	/	/	/

1.3 Operation Voltage (V_{DC}) ▲

Lowest:	3.6	Normal:	3.7	Highest:	4.3
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1.4 Transmission Antenna Information ▲

Antenna Type	Operation Bands	Antenna Frequency Range (MHz)	Antenna Gain (G _T) (dBi)	L _c (dB)
PCB	LTE B2	1850-1910	1.84	0
	LTE B4	1710-1755	3.16	0
	LTE B5	824-849	-1.04	0
	LTE B12	699-716	-2.34	0
	LTE B66	1710-1780	3.16	0
Note: L _c = Signal Attenuation in the connecting cable between the transmitter and antenna, in dB.				

1.5 Equipment Modifications

No modifications are made to the EUT during all test items.

2. SUMMARY OF TEST RESULTS

Cellular Band: LTE Band 5:

FCC Standard Rule(s)	ISED Standard Rule(s)	Description of Test	Result	Section
/	RSS-132 Clause 5.1	Frequency Sub-bands	Compliant	4.7.2
/	RSS-132 Clause 5.2	Types of Modulation	Compliant	4.9.2
§ 2.1055, § 22.355	RSS-132 Clause 5.3	Frequency stability	Compliant	5.1
§2.1046; § 22.913	RSS-132 Clause 5.4	Transmitter output power and effective radiated power (e.r.p.)	Compliant	5.1
§ 2.1051, § 22.917 (a)	RSS-132 Clause 5.5	Transmitter unwanted emissions- at Antenna Terminal	Compliant	5.1
§ 22.917 (a)	RSS-132 Clause 5.5	Transmitter unwanted emissions- Out of band emission	Compliant	5.1
§ 2.1053, § 22.917 (a)	RSS-132 Clause 5.5	Transmitter unwanted emissions- Radiated Spurious emissions	Compliant	5.2
§ 2.1049; § 22.905	RSS-Gen Clause 6.7	Occupied Bandwidth	Compliant	5.1
§1.1310, §2.1091	/	RF Exposure Evaluation	Compliant	/
/	RSS-102 Clause 6.6	Exemption Limits For Routine Evaluation-RF Exposure Evaluation	Compliant	/

PCS Band: LTE Band 2:

FCC Standard Rule(s)	ISED Standard Rule(s)	Description of Test	Result	Section
/	RSS-133 Clause 5.2	Band plan	Compliant	4.8.2
/	RSS-133 Clause 5.3	Types of Modulation	Compliant	4.9.2
§ 2.1055, § 24.235	RSS-133 Clause 5.4	Frequency stability	Compliant	5.1
§2.1046, § 24.232	RSS-133 Clause 5.5	Transmitter output power	Compliant	5.1
§ 2.1051, § 24.238 (a)	RSS-133 Clause 5.6	Transmitter unwanted emissions- at Antenna Terminal	Compliant	5.1
§ 24.238 (a)	RSS-133 Clause 5.6	Transmitter unwanted emissions- Out of band emission	Compliant	5.1
§ 2.1053, § 24.238 (a)	RSS-133 Clause 5.6	Transmitter unwanted emissions- Radiated Spurious emissions	Compliant	5.2
§ 2.1049, § 24.238	RSS-Gen Clause 6.7	Occupied Bandwidth	Compliant	5.1
§1.1310, §2.1091	/	RF Exposure Evaluation	Compliant	/
/	RSS-102 Clause 6.6	Exemption Limits For Routine Evaluation-RF Exposure Evaluation	Compliant	/

AWS Band: LTE Band 4/LTE B66:

FCC Standard Rule(s)	ISED Standard Rule(s)	Description of Test	Result	Section
/	RSS-139 Clause 5.2	Band Plan	Compliant	4.8.2
/	RSS-139 Clause 5.3	Types of Modulation	Compliant	4.9.2
/	RSS-139 Clause 5.7	Additional Requirements for Subscriber Equipment	Compliant	4.11.2
§ 2.1055	RSS-139 Clause 5.4	Frequency stability	Compliant	5.1
FCC§2.1046, §27.50	RSS-139 Clause 5.5	Transmitter Output Power	Compliant	5.1
FCC§ 2.1051, §27.53	RSS-139 Clause 5.6	Transmitter unwanted emissions-at Antenna Terminal	Compliant	5.1
§27.53	RSS-139 Clause 5.6	Transmitter unwanted emissions-Bandedge	Compliant	5.1
§ 2.1053, §27.53	RSS-139 Clause 5.6	Transmitter unwanted emissions-Radiated Spurious emissions	Compliant	5.2
§ 2.1049, §27.53	RSS-Gen Clause 6.7	Occupied Bandwidth	Compliant	5.1
§1.1310, §2.1091	/	RF Exposure Evaluation	Compliant	/
/	RSS-102 Clause 6.6	Exemption Limits For Routine Evaluation-RF Exposure Evaluation	Compliant	/

LTE Band 12:

FCC Standard Rule(s)	ISED Standard Rule(s)	Description of Test	Result	Section
/	RSS-130 Clause 4.2	Types of modulation	Compliant	4.9.2
/	RSS-130 Clause 4.3	Frequency block	Compliant	4.10.2
/	RSS-130 Clause 4.4	Interoperability requirement	Compliant	4.12.2
§ 2.1055	RSS-130 Clause 4.5	Transmitter frequency stability	Compliant	5.1
§2.1046, §27.50	RSS-130 Clause 4.6	Transmitter output power and effective radiated power (e.r.p.)	Compliant	5.1
§ 2.1051, §27.53	RSS-130 Clause 4.7	Transmitter unwanted emissions-at Antenna Terminal	Compliant	5.1
§27.53	RSS-130 Clause 4.7	Transmitter unwanted emissions-Out of band emission	Compliant	5.1
§ 2.1053, §27.53	RSS-130 Clause 4.7	Transmitter unwanted emissions-Radiated Spurious emissions	Compliant	5.2
§ 2.1049, §27.53	RSS-Gen Clause 6.7	Occupied Bandwidth	Compliant	5.1
§1.1310, §2.1091	/	RF Exposure Evaluation	Compliant	/
/	RSS-102 Clause 6.6	Exemption Limits For Routine Evaluation-RF Exposure Evaluation	Compliant	/

3. DESCRIPTION OF TEST CONFIGURATION

3.1 EUT Operation Condition:

The EUT was configured for testing according to ANSI C63.26-2015.

The test items were performed with the EUT operating at testing mode. The device operates on LTE band 2/4/5/12/66, test was performed with channels as below table:

Frequency Bands	Bandwidth (MHz)	Test Frequency (MHz)		
		Low	Middle	High
LTE Band 2	1.4	1850.7	1880	1909.3
	3	1851.5	1880	1908.5
	5	1852.5	1880	1907.5
	10	1855	1880	1905
	15	1857.5	1880	1902.5
	20	1860	1880	1900
LTE Band 4	1.4	1710.7	1732.5	1754.3
	3	1711.5	1732.5	1753.5
	5	1712.5	1732.5	1752.5
	10	1715	1732.5	1750
	15	1717.5	1732.5	1747.5
	20	1720	1732.5	1745
LTE Band 5	1.4	824.7	836.5	848.3
	3	825.5	836.5	847.5
	5	826.5	836.5	846.5
	10	829	836.5	844
LTE Band 12	1.4	699.7	707.5	715.3
	3	700.5	707.5	714.5
	5	701.5	707.5	713.5
	10	704	707.5	711
LTE Band 66	1.4	1710.7	1745	1779.3
	3	1711.5	1745	1778.5
	5	1712.5	1745	1777.5
	10	1715	1745	1775
	15	1717.5	1745	1772.5
	20	1720	1745	1770

The maximum power was configured per 3GPP Standard for each operation modes as below setting:

LTE (FDD):

The following tests were conducted according to the test requirements in 3GPP TS36.101

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10, 15, 20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 ¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

3.2 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Wideband Radio Communication Tester	CMW500	144976
Unknown	Antenna	Unknown	Unknown
DTECH	Adapter	GO24-090200-AX	4007202-CS

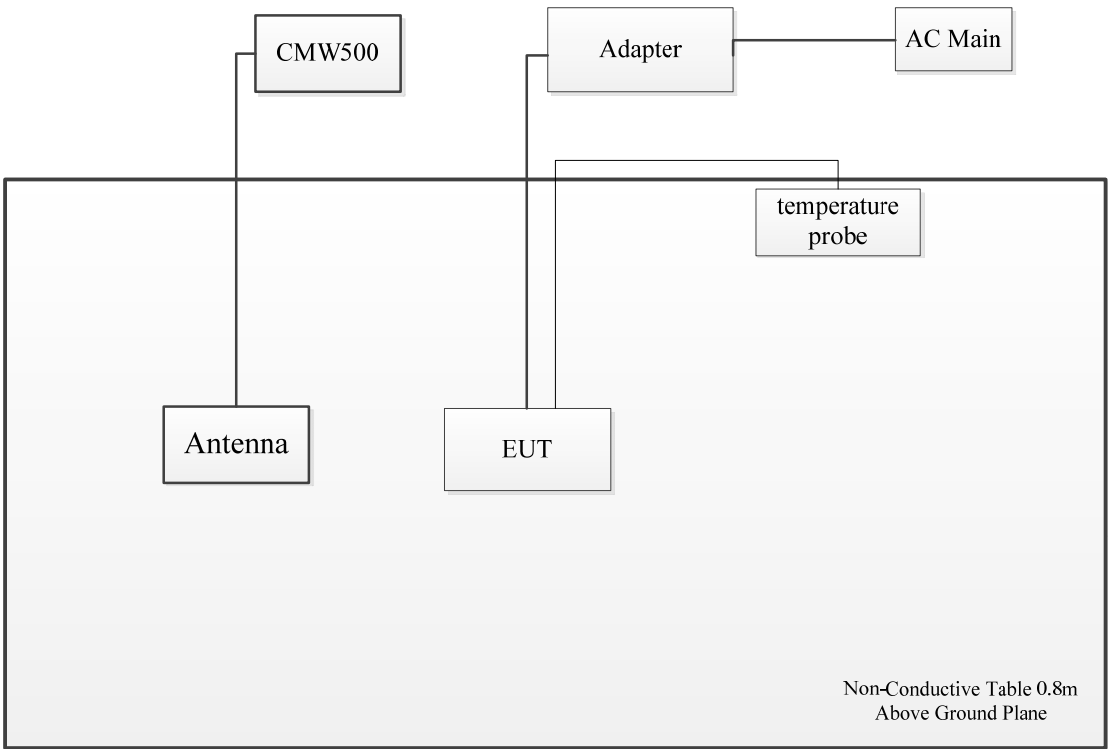
3.3 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	No	No	1.5	Adapter	EUT
Signal Cable*1pin (line1#)	No	No	2	Temperature Probe	EUT
Signal Cable	Yes	No	10	Antenna	CMW500

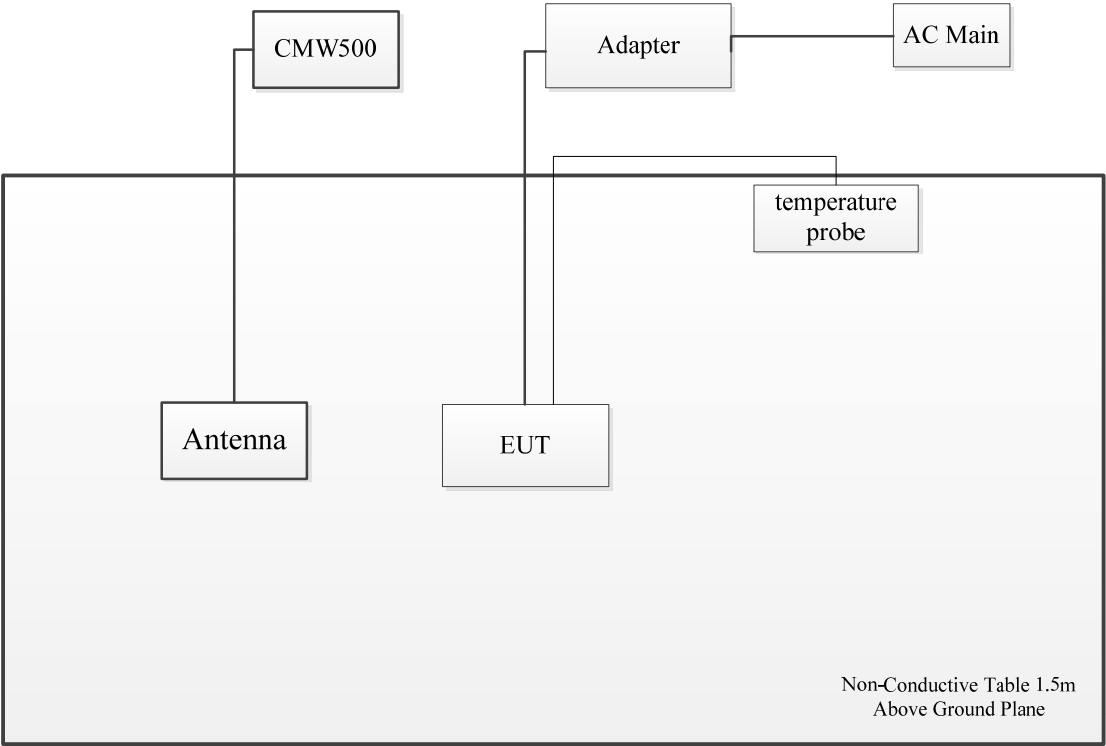
3.4 Block Diagram of Test Setup

Radiated Spurious emissions:

Below 1G:



Above 1G:



3.5 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 829273, the FCC Designation No.: CN5044.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

3.6 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.55 dB
Power Spectral Density, conducted	±0.55 dB
Unwanted Emissions, radiated	30MHz~1GHz: 5.12 dB, 1GHz~18GHz: 5.61 dB, 18GHz~26.5GHz: 5.33 dB, 26.5GHz~40GHz: 5.33 dB
Unwanted Emissions, conducted	±2.47 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
RF Frequency	±0.076×10 ⁻⁶

4. REQUIREMENTS AND TEST PROCEDURES

4.1 Transmitter output power and equivalent radiated power:

4.1.1 Applicable Standard

FCC §22.913

(a)(5) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7watts.

(d) *Power measurement.* Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-toaverage ratio (PAR) of the transmission must not exceed 13 dB. Power measurements for base transmitters and repeaters must be made in accordance with either of the following:

- (1) A Commission-approved average power technique (see FCC Laboratory's Knowledge Database); or
- (2) For purposes of this section, peak transmit power must be measured over an interval of continuous transmission using instrumentation calibrated in terms of an rmsequivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

FCC §24.232

(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of § 24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

FCC §27.50

(c)(10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

(d)(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

RSS-130 clause 4.6.1

The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

RSS-130 clause 4.6.3 Frequency bands 698-756 MHz and 777-787 MHz

The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

For base and fixed equipment other than fixed subscriber equipment, refer to SRSP-518 for the e.i.r.p. limits.

RSS-132 clause 5.4

The transmitter output power shall be measured in terms of average power. The equivalent radiated power (e.r.p.) shall not exceed 7 watts for mobile equipment and 3 watts for portable equipment.

The effective isotropic radiated power (e.i.r.p.) shall not exceed the limits specified in SRSP-503 for base station equipment.

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

RSS-133 clause 5.5

The maximum power spectral density of the equipment, measured in terms of average values, shall comply with the limits specified in table 2. These limits are either specified in terms of equivalent isotropically radiated power (e.i.r.p.) or TRP for the purpose of certification and may not apply to all deployment scenarios. Consult SRSP-510 for more deployment details in the bands 1850-1915 MHz and 1930-1995 MHz.

AAS equipment with eight antenna elements or less can demonstrate compliance with the e.i.r.p limit specified for non-AAS equipment in table 2, instead of the TRP limit.

Table 2: Maximum power spectral density of equipment

Equipment type	Maximum power spectral density
Non-AAS fixed station and base station	3280 W/MHz e.i.r.p
AAS fixed station and base station	46 dBm/MHz TRP
Subscriber equipment	2 W /channel bandwidth e.i.r.p

In addition, the peak-to-average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal corresponding to the highest PAPR during periods of continuous transmission.

RSS-139 clause 5.5

The maximum output power of the equipment shall comply with the limits specified below. In the tables, maximum power refers to the equivalent isotropically radiated power (e.i.r.p.) or total radiated power (TRP), measured in terms of average values.

The limits in this RSS are specified for the purpose of certification and may not apply to all deployment scenarios. Consult SRSP-513 and SRSP-519 for more details on the bands 2110-2180 MHz and 2180-2200 MHz respectively.

Table 3: Maximum power of equipment in the band 1710-1780 MHz

Equipment type	Maximum power
Fixed station and base station	30 dBm e.i.r.p./channel bandwidth
Subscriber equipment	30 dBm e.i.r.p./channel bandwidth

Table 4: Maximum power of equipment in the band 2110-2180 MHz

Equipment type	Maximum power
Non-AAS fixed station and base station	65 dBm e.i.r.p./MHz
AAS fixed station and base station	46 dBm TRP/MHz
Subscriber equipment	30 dBm e.i.r.p./channel bandwidth

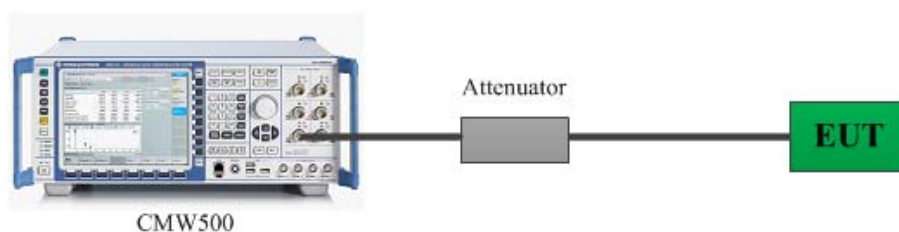
Table 5: Maximum power of equipment in the band 2180-2200 MHz

Equipment type	Maximum power
Non-AAS base station	65 dBm e.i.r.p./MHz
AAS base station	46 dBm TRP/MHz

In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

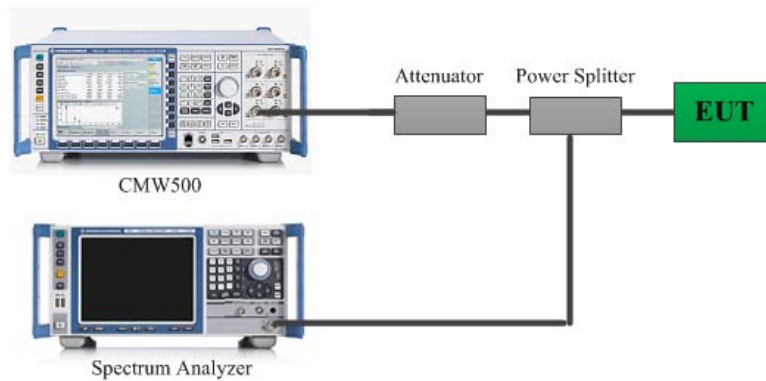
4.1.2 Test Setup Block

For RF Output Power:



Note: The Insertion loss of the RF cable and coaxial Attenuator was offset into the Reading of CMW500.

For PAR:



Note: The Insertion loss of the RF cable and Power Splitter was offset into the Reading of Spectrum Analyzer.

4.1.3 Test Procedure

For RF Output Power:

According to CFR Part 2.1046, ANSI C63.26-2015 Section 5.2.5.5:

Connect the instrument and the EUT according to the Test Setup Block, and then read the Test results on the CMW500/Wireless Communication Test Set.

For PAR:

- a) Set resolution/measurement bandwidth $\geq$ OBW or specified reference bandwidth.
- b) Set the number of counts to a value that stabilizes the measured CCDF curve.
- c) Set the measurement interval as follows:
 - 1) For continuous transmissions, set to the greater of $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ or 1 ms.
 - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
 - 3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
- d) Record the maximum PAPR level associated with a probability of 0.1%.
- e) The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.

4.1.4 Test Results

Please refer to section 5.1.

4.2 Occupied Bandwidth

4.2.1 Applicable Standard

FCC §22.917

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

(1) In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz

FCC §24.238

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

FCC §27.53

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or

greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

(h) AWS emission limits

(1) **General protection levels.** Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

RSS-Gen Clause 6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the “x dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

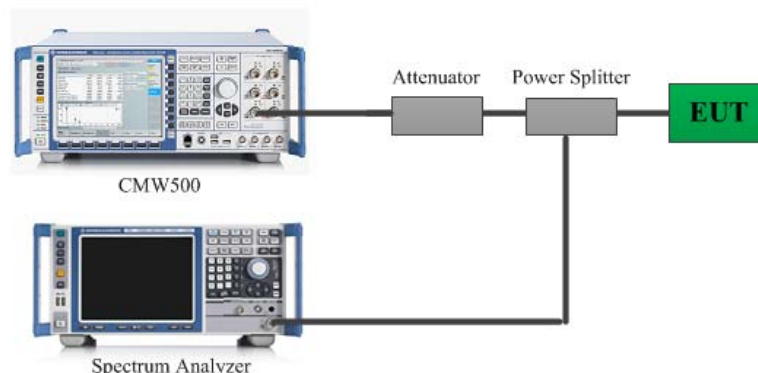
The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.

The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

4.2.2 Test Setup Block



Note: The Insertion loss of the RF cable and Power Splitter was offset into the Reading of Spectrum Analyzer.

4.2.3 Test Procedure

According to ANSI C63.26-2015 Section 5.4.4

The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring (99%) power bandwidth:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of $1.5 \times \text{OBW}$ is sufficient).
- b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.
- d) Set the detection mode to peak, and the trace mode to max-hold.
- e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.
- f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

4.2.4 Test Results

Please refer to section 5.1.

4.3 Frequency stability

4.3.1 Applicable Standard

FCC §2.1055

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

- (1) From -30° to $+50^{\circ}$ centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
- (2) From -20° to $+50^{\circ}$ centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, uncrewed aircraft stations (as defined in § 88.5 of this chapter) in the Uncrewed Aircraft System Services under part 88 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.
- (3) From 0° to $+50^{\circ}$ centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(c) In addition to all other requirements of this section, the following information is required for equipment incorporating heater type crystal oscillators to be used in mobile stations, for which type acceptance is first requested after March 25, 1974, except for battery powered, hand carried, portable equipment having less than 3 watts mean output power.

- (1) Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance. Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0° centigrade and $+30^{\circ}$ centigrade with no primary power applied.
- (2) Beginning at each temperature level specified in paragraph (c)(1) of this section, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to rise more than 10° centigrade above the respective beginning ambient temperature level.
- (3) The elapsed time necessary for the frequency to stabilize within the applicable tolerance from each beginning ambient temperature level as determined from the tests specified in this paragraph shall be specified in the instruction book for the transmitter furnished to the user.
- (4) When it is impracticable to subject the complete transmitter to this test because of its physical dimensions or power rating, only its frequency determining and stabilizing portions need be tested.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in [paragraphs \(a\), \(b\), \(c\), and \(d\)](#) of this section. (For example measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

FCC §22.355

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1 - Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20	20	50
50 to 450	5	5	50
450 to 512	2.5	5	5
821 to 896	1.5	2.5	2.5
928 to 929	5	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10	n/a	n/a

FCC §24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS-132 clause 5.3

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within each of the sub-bands when tested at the temperature and supply voltage variations specified in RSS-Gen.

RSS-133 clause 5.4

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block or frequency block group when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS-139 clause 5.4

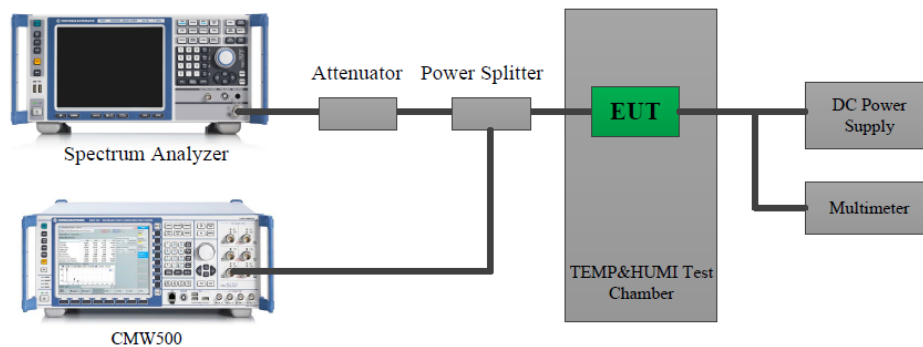
The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block or frequency block group when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS-130 clause 4.5

For equipment that is capable of transmitting numerous channels simultaneously for different applications (e.g. LTE and narrowband – internet of things (IoT)), the occupied bandwidth shall be the bandwidth representing the sum of the occupied bandwidths of these channels.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

4.3.2 Test Setup Block



Note: The Insertion loss of the RF cable and Power Splitter was offset into the Reading of Spectrum Analyzer.

4.3.3 Test Procedure

According to ANSI C63.26-2015 Section 5.6:

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

- At 10 °C intervals of temperatures between –30 °C and +50 °C at the manufacturer's rated supply voltage, and
- At +20 °C temperature and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage then the –15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

4.3.4 Test Results

Please refer to section 5.1.

4.4 Transmitter unwanted emissions-at antenna terminals

4.4.1 Applicable Standard

FCC §22.917

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

(1) In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz

FCC §24.238

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

FCC §27.53

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

(h) AWS emission limits

(1) **General protection levels.** Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz,

2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

RSS-132 clause 5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

- (i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).
- (ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS-133 clause 5.6

Unwanted emissions shall be measured in terms of average values while the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified in table 3, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

For the unwanted emission limits, in the 1 MHz bands immediately outside and adjacent to the frequency block group, the power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth (OBW). Beyond these 1 MHz bands, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth may be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% of the OBW, as applicable.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors), where applicable, of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in the table 3.

Table 3: Unwanted emission limits for all equipment

Offset frequency from the edge of the frequency block group (MHz)	Unwanted emission limit
≤ 1	-13 dBm/(1% of OBW)
> 1	-13 dBm/MHz

RSS-139 clause 5.6

Unwanted emissions shall be measured in terms of average values.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors) of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in table 6.

Table 6: Unwanted emission limits	
Offset from the edge of the frequency block or frequency block group	Unwanted emission limits
≤ 1 MHz	-13 dBm/(1% of OB*)
> 1 MHz	-13 dBm/MHz

*OB is the occupied bandwidth.

In addition to complying with the above limits, equipment operating in the band 2180-2200 MHz may require additional filtering (see SRSP-519).

RSS-130 clause 4.7.1 General unwanted emissions limits

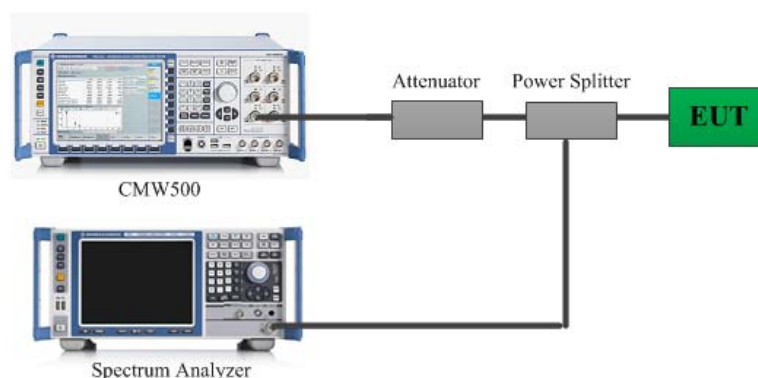
The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

RSS-130 clause 4.7.2 Additional unwanted emissions limits

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
 - (i) $76 + 10 \log_{10} p$ (watts), dB, for base and fixed equipment, and
 - (ii) $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment.
- b) The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz

4.4.2 Test Setup Block



Note: The Insertion loss of the RF cable and Power Splitter was offset into the Reading of Spectrum Analyzer.

4.4.3 Test Procedure

According to ANSI C63.26-2015 Section 5.7.4:

the applicable rule part specifies the reference bandwidth for measuring unwanted emission levels (typically, 100 kHz if the authorized frequency band/block is at or below 1 GHz and 1 MHz if the authorized frequency band/block is above 1 GHz),⁸ effectively depicting the unwanted emission limit in terms of a power spectral density. In those cases where no reference bandwidth is explicitly specified, the values in the preceding sentence should be used.

4.4.4 Test Results

Please refer to section 5.1.

4.5 Transmitter unwanted emissions-Out of band emission

4.5.1 Applicable Standard

FCC §22.917

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

(1) In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz

FCC §24.238

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

FCC §27.53

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

(h) AWS emission limits

(1) **General protection levels.** Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz,

2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

RSS-132 clause 5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

- (iii) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).
- (iv) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS-133 clause 5.6

Unwanted emissions shall be measured in terms of average values while the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified in table 3, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

For the unwanted emission limits, in the 1 MHz bands immediately outside and adjacent to the frequency block group, the power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth (OBW). Beyond these 1 MHz bands, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth may be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% of the OBW, as applicable.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors), where applicable, of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in the table 3.

Table 3: Unwanted emission limits for all equipment

Offset frequency from the edge of the frequency block group (MHz)	Unwanted emission limit
≤ 1	-13 dBm/(1% of OBW)
> 1	-13 dBm/MHz

RSS-139 clause 5.6

Unwanted emissions shall be measured in terms of average values.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors) of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in table 4.

Table 6: Unwanted emission limits	
Offset from the edge of the frequency block or frequency block group	Unwanted emission limits
≤1 MHz	-13 dBm/(1% of B*)
>1 MHz	-13 dBm/MHz

*B is the frequency block or frequency block group.

In addition to complying with the above limits, equipment operating in the band 2180-2200 MHz may require additional filtering (see SRSP-519).

RSS-130 clause 4.7.1 General unwanted emissions limits

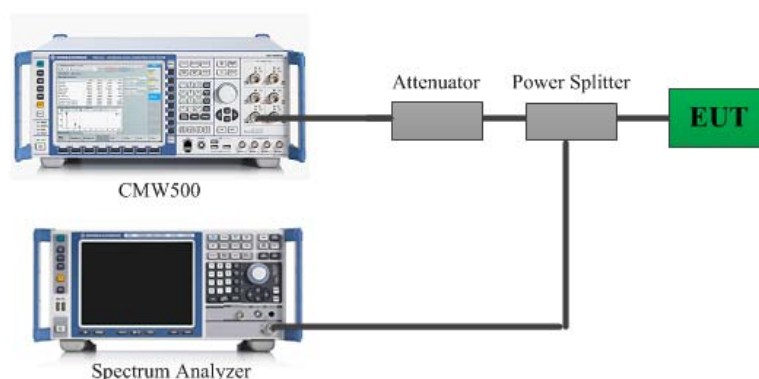
The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

RSS-130 clause 4.7.2 Additional unwanted emissions limits

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
 - (i) $76 + 10 \log_{10} p$ (watts), dB, for base and fixed equipment, and
 - (ii) $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment.
- b) The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

4.5.2 Test Setup Block



Note: The Insertion loss of the RF cable and Power Splitter was offset into the Reading of Spectrum Analyzer.

4.5.3 Test Procedure

According to ANSI C63.26-2015 Section 5.7.3:

Typically, a measurement (resolution) bandwidth smaller than the reference bandwidth is allowed for measurements within a specified frequency range at the edge of the authorized frequency block/band (e.g., within the first Y MHz outside of the authorized frequency band/block, where the value of Y is specified in the relevant rule part). Some FCC out-of-band emission rules permit the use of a narrower RBW (typically limited to a minimum RBW of 1 % of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth. Beyond the specified frequency range in which this relaxation of the uniform reference bandwidth is permitted, it typically is also acceptable to use a narrower RBW (again limited to a minimum of 1 % of OBW) to increase accuracy, but the measurement result must subsequently be integrated over the full reference bandwidth.

4.5.4 Test Results

Please refer to section 5.1.

4.6 Transmitter unwanted emissions-Radiated Spurious emissions:

4.6.1 Applicable Standard

FCC §22.917

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

(1) In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz

FCC §24.238

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

FCC §27.53

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

(h) AWS emission limits

(1) **General protection levels.** Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz,

2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

RSS-132 clause 5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

- (v) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).
- (vi) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS-133 clause 5.6

Unwanted emissions shall be measured in terms of average values while the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified in table 3, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

For the unwanted emission limits, in the 1 MHz bands immediately outside and adjacent to the frequency block group, the power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth (OBW). Beyond these 1 MHz bands, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth may be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% of the OBW, as applicable.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors), where applicable, of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in the table 3.

Table 3: Unwanted emission limits for all equipment

Offset frequency from the edge of the frequency block group (MHz)	Unwanted emission limit
≤ 1	-13 dBm/(1% of OBW)
> 1	-13 dBm/MHz

RSS-139 clause 5.6

Unwanted emissions shall be measured in terms of average values.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors) of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in table 4.

Table 6: Unwanted emission limits

Offset from the edge of the frequency block or frequency block group	Unwanted emission limits
≤1 MHz	-13 dBm/(1% of B*)
>1 MHz	-13 dBm/MHz

*B is the frequency block or frequency block group.

In addition to complying with the above limits, equipment operating in the band 2180-2200 MHz may require additional filtering (see SRSP-519).

RSS-130 clause 4.7.1 General unwanted emissions limits

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

RSS-130 clause 4.7.2 Additional unwanted emissions limits

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
 - (i) $76 + 10 \log_{10} p$ (watts), dB, for base and fixed equipment, and
 - (ii) $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment.
- b) The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

4.6.2 Test setup

According to ANSI C63.26-2015 Section 5.5.3:

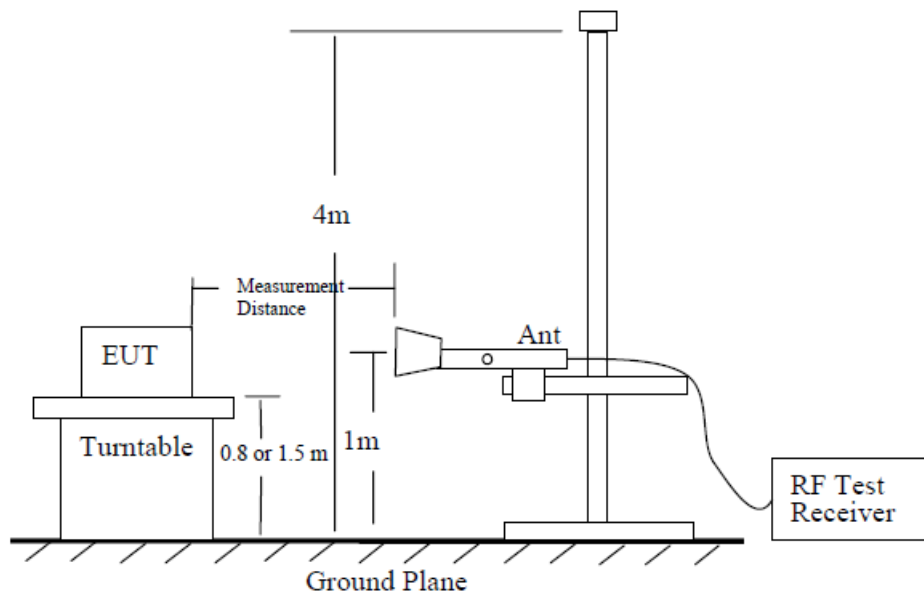


Figure 6 —Test site-up for radiated ERP and/or EIRP measurements

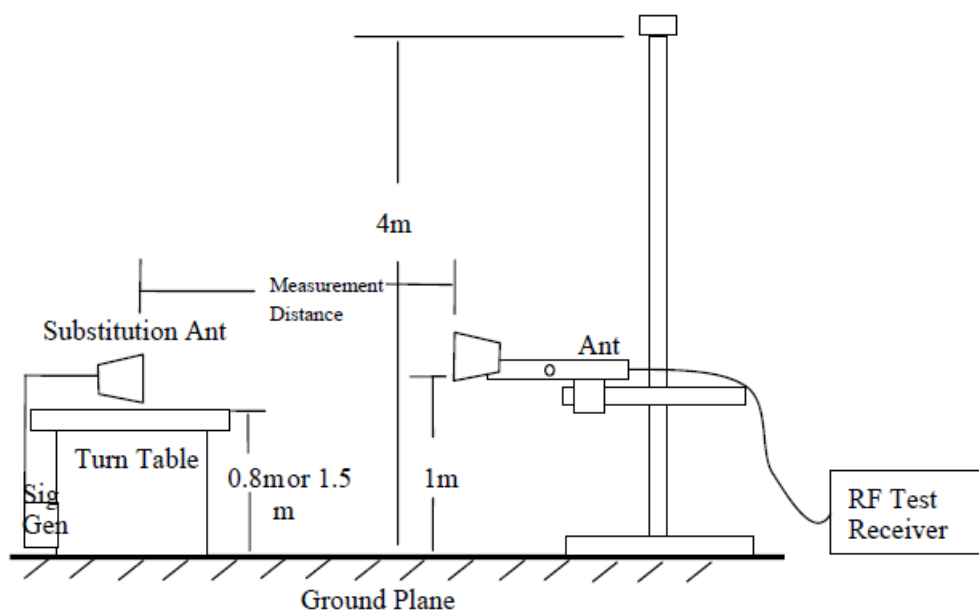


Figure 7 —Substitution method set-up for radiated emission

4.6.3 Test Procedure

According to ANSI C63.26-2015 Section 5.5.3:

- a) Place the EUT in the center of the turntable. The EUT shall be configured to transmit into the standard non-radiating load (for measuring radiated spurious emissions), connected with cables of minimal length unless specified otherwise. If the EUT uses an adjustable antenna, the antenna shall be positioned to the length that produces the worst case emission at the fundamental operating frequency.
- b) Each emission under consideration shall be evaluated:
 - 1) Raise and lower the measurement antenna in accordance 5.5.2, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
 - 2) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
 - 3) Return the turntable to the azimuth where the highest emission amplitude level was observed.
 - 4) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
 - 5) Record the measured emission amplitude level and frequency using the appropriate RBW.
- c) Repeat step b) for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
- d) Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
- e) Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
- f) Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
- g) For each emission that was detected and measured in the initial test [i.e., in step b) and step c)]:
 - 1) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
 - 2) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step b) and step c).
 - 3) Record the output power level of the signal generator when equivalence is achieved in step 2).
- h) Repeat step e) through step g) with the measurement antenna oriented in the opposite polarization.
- i) Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:
$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$
where
 - P_e = equivalent emission power in dBm
 - P_s = source (signal generator) power in dBmNOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.
- j) Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from: $\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB}$. If necessary, the antenna gain can be calculated from calibrated antenna factor information
- k) Provide the complete measurement results as a part of the test report.

4.6.4 Test Results

Please refer to section 5.2.

4.7 Frequency Sub-bands

4.7.1 Applicable Standard

RSS-132 clause 5.1

The frequency bands 824-849 MHz and 869-894 MHz are divided into sub-bands as described in SRSP-503. These sub-bands are:

824-835 MHz, 835-845 MHz, 845-846.5 MHz, and 846.5-849 MHz for mobile transmit; and

869-880 MHz, 880-890 MHz, 890-891.5 MHz, and 891.5-894 MHz for base transmit.

4.7.2 Judgment

Compliant, the device operates in this band is divided into sub-bands as described in SRSP-503.

4.8 Band plan

4.8.1 Applicable Standard

RSS-133 clause 5.2

The bands 1850-1915 MHz and 1930-1995 MHz are divided into 11 paired frequency blocks as shown in table 1. Frequency blocks may be aggregated to form a frequency block group. SRSP 510, Technical Requirements for Personal Communications Services (PCS) in the Bands 1850-1915 MHz and 1930-1995 MHz, contains the detailed band plan.

Table 1: Paired frequency blocks in the 1850-1915 MHz and 1930-1995 MHz bands

Block	Lower sub-band (MHz)	Upper sub-band (MHz)	Total spectrum (MHz)
A	1850-1865	1930-1945	30
D	1865-1870	1945-1950	10
B1	1870-1875	1950-1955	10
B2	1875-1880	1955-1960	10
B3	1880-1885	1960-1965	10
E	1885-1890	1965-1970	10
F	1890-1895	1970-1975	10
C1	1895-1900	1975-1980	10
C2	1900-1905	1980-1985	10
C3	1905-1910	1985-1990	10
G	1910-1915	1990-1995	10

RSS-139 clause 5.2

The bands 1710-1780 MHz and 2110-2180 MHz are divided into 11 paired blocks as shown in table 1. Standard Radio System Plan SRSP-513, Technical Requirements for Advanced Wireless Services in the Bands 1710-1780 MHz and 2110-2180 MHz, contains the detailed band plan.

Table 1: Frequency blocks in the bands 1710-1780 MHz and 2110-2180 MHz			
Block	Lower sub-band (MHz)	Upper sub-band (MHz)	Total block size (MHz)
Block A	1710-1720	2110-2120	20
Block B	1720-1730	2120-2130	20
Block C	1730-1735	2130-2135	10
Block D	1735-1740	2135-2140	10
Block E	1740-1745	2140-2145	10
Block F	1745-1755	2145-2155	20
Block G	1755-1760	2155-2160	10
Block H	1760-1765	2160-2165	10
Block I	1765-1770	2165-2170	10
Block J1	1770-1775	2170-2175	10
Block J2	1775-1780	2175-2180	10

The band 2180-2200 MHz is divided into two downlink-only blocks, as shown in table 2. SRSP-519, Technical Requirements for the Ancillary Terrestrial Component of Mobile-Satellite Service Systems Operating in the Bands 2000-2020 MHz and 2180-2200 MHz, contains the detailed band plan. In this RSS, AWS-4 is referred to as ATC band 2180-2200 MHz.

Table 2: Frequency blocks in the bands 2180-2200 MHz		
Block	Frequency range (MHz)	Block size (MHz)
Block C	2180-2190	10
Block D	2190-2200	10

The blocks listed in tables 1 and 2 can be aggregated to form a larger channel.

4.8.2 Judgment

Compliant, the device operates in this band is Compliant with SRSP-510, SRSP-513.

4.9 Types of Modulation

4.9.1 Applicable Standard

RSS-132 clause 5.2

Equipment certified under this standard shall use digital modulation.

RSS-133 clause 5.3

The modulation used shall be digital.

RSS-139 clause 5.3

Devices may use any type of modulation technique. The type of modulation shall be documented in the test report.

RSS-130 clause 4.2

Equipment certified under this standard shall employ digital modulation

4.9.2 Judgment

Compliant, the device operates under this standard use digital modulation.

4.10 Frequency block

4.10.1 Applicable Standard

RSS-130 clause 4.3

The frequency bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz are divided into small frequency blocks as per SRSP-518. Equipment shall operate according to the frequency plan given in the SRSP.

4.10.2 Judgment

Compliant, the device operates in the frequency bands 663-698 MHz, 698-756 MHz and 777-787 MHz are divided into small frequency blocks as per SRSP-518. Equipment shall operate according to the frequency plan given in the SRSP.

4.11 Additional requirements for subscriber equipment

4.11.1 Applicable Standard

RSS-139 clause 5.7

Subscriber equipment other than fixed subscriber equipment shall use transmitter power control to limit power. The applicant shall include, with the application for certification, a declaration of compliance that confirms the control requirement was met and that includes a description of how the requirement was met. The declaration of compliance may be included as a separate document or attached (e.g. as an annex) to the test report.

Subscriber equipment operating in the band 1755-1780 MHz shall operate only when under the control of a base station. The applicant shall include, with the application for certification, a declaration of compliance that confirms the control requirement was met and that includes a description of how the requirement was met. The declaration of compliance may be included as a separate document or attached (e.g. as an annex) to the test report.

4.11.2 Judgment

Compliant, the devices use transmitter power control to limit power and operate under the control of a base station.

5. Test DATA AND RESULTS

5.1 Antenna Port Test Data and Results

Please refer to the attachment Appendix A.

5.2 Radiated Spurious Emissions

Serial Number:	3MR3-4	Test Date:	2026/6/10~2026/6/11
Test Site:	Chamber 10m , Chamber B	Test Mode:	Transmitting
Tester:	Mikey Lin , Alan Xie	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	25.3~26.2	Relative Humidity: (%)	37~47	ATM Pressure: (kPa)	100.2~100.5
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
30MHz~1000MHz					
Sunol Sciences	Hybrid Antenna	JB3	A060611-1	2025/6/23	2028/6/22
Narda	Coaxial Attenuator	779-6dB	4269	2025/6/23	2028/6/22
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2025/7/1	2026/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2025/7/1	2026/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2025/7/1	2026/6/30
Sonoma	Amplifier	310N	185914	2025/8/25	2026/8/24
R&S	EMI Test Receiver	ESR3	102453	2025/6/25	2026/6/24
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Micro-Coax	Coaxial Cable	UFA210B	99G1448	2025/9/4	2026/9/3
Agilent	Signal Generator	E8247C	MY43321350	2025/7/28	2026/7/27
E-Microwave	Band Rejection Filter	OBF-ZP-703-748-SMAF	OE01902425	2026/3/30	2027/3/29
Sinoscite	Band Rejection Filter	BSF824-862MS	1438001	2026/3/30	2027/3/29
Above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2023/9/7	2026/9/6
AH	Horn Antenna	SAS-571	1177	2026/1/22	2029/1/21
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2026/2/21	2029/2/20
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-03 1304	2026/2/6	2029/2/5
Xinhang Macrowave	Coaxial Cable	XH750A-N/J-SMA/J-10M	20231117004 #0001	2025/11/14	2026/11/13
Xinhang Macrowave	Coaxial Cable	XH360A-2.92/J-2.92/J-6M-A	20231208001 #0001	2025/11/14	2026/11/13
Micro-Coax	Coaxial Cable	UFA210B	99G1448	2025/9/4	2026/9/3
Agilent	Signal Generator	E8247C	MY43321350	2025/7/28	2026/7/27
AH	Preamplifier	PAM-0118P	469	2026/4/10	2027/4/10
AH	Preamplifier	PAM-1840VH	191	2025/7/31	2026/7/30
R&S	Spectrum Analyzer	FSV40	101944	2025/8/8	2026/8/7
Decentest	Multiplex Switch Test Control Set & Filter Switch Unit	DT7220SCU & DT7220FSU	DS79902 & DS79905	2025/8/25	2026/8/24

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

LTE Bands:

(The Worst modulation and bandwidth were below)

LTE Band 2(30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1RB, 1.4MHz, QPSK, Frequency:1850.7 MHz								
138.47	H	45.15	-65.17	0.00	0.35	-65.52	-13.00	52.52
79.64	V	50.52	-54.55	-0.18	0.26	-54.99	-13.00	41.99
3701.40	H	65.81	-46.78	10.72	0.74	-36.80	-13.00	23.80
3701.40	V	65.42	-47.49	10.72	0.74	-37.51	-13.00	24.51
5552.10	H	60.18	-51.13	11.69	1.05	-40.49	-13.00	27.49
5552.10	V	63.13	-47.73	11.69	1.05	-37.09	-13.00	24.09
1RB, 1.4MHz, QPSK, Frequency:1880 MHz								
138.16	H	45.31	-65.03	0.00	0.35	-65.38	-13.00	52.38
79.33	V	50.12	-54.81	-0.34	0.26	-55.41	-13.00	42.41
3760.00	H	63.56	-48.90	10.76	0.75	-38.89	-13.00	25.89
3760.00	V	60.22	-52.38	10.76	0.75	-42.37	-13.00	29.37
5640.00	H	60.81	-50.61	11.67	1.05	-39.99	-13.00	26.99
5640.00	V	63.01	-47.90	11.67	1.05	-37.28	-13.00	24.28
1RB, 1.4MHz, QPSK, Frequency:1909.3 MHz								
138.55	H	45.24	-65.08	0.00	0.35	-65.43	-13.00	52.43
79.14	V	50.77	-54.07	-0.43	0.26	-54.76	-13.00	41.76
3818.60	H	58.67	-53.50	10.79	0.76	-43.47	-13.00	30.47
3818.60	V	56.99	-55.12	10.79	0.76	-45.09	-13.00	32.09
5727.90	H	52.54	-59.45	11.65	1.05	-48.85	-13.00	35.85
5727.90	V	52.19	-59.17	11.65	1.05	-48.57	-13.00	35.57

LTE Band 4(30MHz-18GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1RB, 1.4MHz, QPSK, Frequency:1710.7 MHz								
138.11	H	45.07	-65.27	0.00	0.35	-65.62	-13.00	52.62
79.08	V	50.81	-54.00	-0.46	0.26	-54.72	-13.00	41.72
3421.40	H	59.55	-53.32	10.54	0.72	-43.50	-13.00	30.50
3421.40	V	62.06	-50.81	10.54	0.72	-40.99	-13.00	27.99
5132.10	H	58.04	-52.96	10.74	0.95	-43.17	-13.00	30.17
5132.10	V	59.94	-50.47	10.74	0.95	-40.68	-13.00	27.68
1RB, 1.4MHz, QPSK, Frequency:1732.5 MHz								
138.36	H	45.33	-65.00	0.00	0.35	-65.35	-13.00	52.35
79.24	V	50.93	-53.96	-0.38	0.26	-54.60	-13.00	41.60
3465.00	H	61.50	-51.74	10.57	0.72	-41.89	-13.00	28.89
3465.00	V	61.70	-51.50	10.57	0.72	-41.65	-13.00	28.65
5197.50	H	63.15	-48.44	10.91	0.97	-38.50	-13.00	25.50
5197.50	V	61.42	-49.38	10.91	0.97	-39.44	-13.00	26.44
1RB, 1.4MHz, QPSK, Frequency:1754.3MHz								
138.51	H	45.96	-64.36	0.00	0.35	-64.71	-13.00	51.71
79.77	V	50.12	-55.01	-0.12	0.26	-55.39	-13.00	42.39
3508.60	H	62.05	-51.45	10.61	0.72	-41.56	-13.00	28.56
3508.60	V	67.70	-45.71	10.61	0.72	-35.82	-13.00	22.82
5262.90	H	62.56	-48.67	11.08	0.99	-38.58	-13.00	25.58
5262.90	V	64.75	-45.80	11.08	0.99	-35.71	-13.00	22.71

LTE Band 5(30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1RB, 1.4MHz, QPSK, Frequency: 824.7 MHz								
139.60	H	45.38	-64.89	0.00	0.35	-65.24	-13.00	52.24
79.93	V	51.05	-54.16	-0.03	0.26	-54.45	-13.00	41.45
1649.40	H	48.46	-67.70	9.44	0.44	-58.70	-13.00	45.70
1649.40	V	48.58	-68.57	9.44	0.44	-59.57	-13.00	46.57
2474.10	H	48.24	-66.48	9.24	0.62	-57.86	-13.00	44.86
2474.10	V	47.68	-67.11	9.24	0.62	-58.49	-13.00	45.49
3298.80	H	47.93	-63.86	10.44	0.72	-54.14	-13.00	41.14
3298.80	V	47.82	-64.54	10.44	0.72	-54.82	-13.00	41.82
1RB, 1.4MHz, QPSK, Frequency: 836.5 MHz								
139.27	H	45.91	-64.38	0.00	0.35	-64.73	-13.00	51.73
79.81	V	51.49	-53.66	-0.09	0.26	-54.01	-13.00	41.01
1673.00	H	48.58	-67.50	9.48	0.45	-58.47	-13.00	45.47
1673.00	V	48.51	-68.41	9.48	0.45	-59.38	-13.00	46.38
2509.50	H	48.19	-66.34	9.22	0.62	-57.74	-13.00	44.74
2509.50	V	47.22	-67.62	9.22	0.62	-59.02	-13.00	46.02
3346.00	H	47.72	-64.48	10.48	0.72	-54.72	-13.00	41.72
3346.00	V	47.67	-64.85	10.48	0.72	-55.09	-13.00	42.09
1RB, 1.4MHz, QPSK, Frequency: 848.3 MHz								
139.72	H	45.67	-64.59	0.00	0.35	-64.94	-13.00	51.94
79.37	V	51.88	-53.07	-0.31	0.26	-53.64	-13.00	40.64
1696.60	H	48.67	-67.33	9.51	0.46	-58.28	-13.00	45.28
1696.60	V	48.36	-68.33	9.51	0.46	-59.28	-13.00	46.28
2544.90	H	48.12	-66.49	9.29	0.63	-57.83	-13.00	44.83
2544.90	V	47.34	-67.59	9.29	0.63	-58.93	-13.00	45.93
3393.20	H	47.68	-64.95	10.51	0.72	-55.16	-13.00	42.16
3393.20	V	47.59	-65.10	10.51	0.72	-55.31	-13.00	42.31

LTE Band 12 (30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1RB, 1.4MHz, QPSK, Frequency: 699.7MHz								
139.41	H	47.51	-62.77	0.00	0.35	-63.12	-13.00	50.12
79.42	V	51.93	-53.04	-0.29	0.26	-53.59	-13.00	40.59
1399.40	H	51.35	-64.56	8.62	0.38	-56.32	-13.00	43.32
1399.40	V	48.62	-67.08	8.62	0.38	-58.84	-13.00	45.84
2099.10	H	52.86	-61.29	9.84	0.57	-52.02	-13.00	39.02
2099.10	V	49.37	-64.75	9.84	0.57	-55.48	-13.00	42.48
2798.80	H	47.66	-67.22	9.80	0.69	-58.11	-13.00	45.11
2798.80	V	47.85	-66.79	9.80	0.69	-57.68	-13.00	44.68
1RB, 1.4MHz, QPSK, Frequency:707.5 MHz								
139.79	H	47.59	-62.67	0.00	0.35	-63.02	-13.00	50.02
79.28	V	51.36	-53.55	-0.36	0.26	-54.17	-13.00	41.17
1415.00	H	51.05	-64.95	8.71	0.38	-56.62	-13.00	43.62
1415.00	V	48.55	-67.23	8.71	0.38	-58.90	-13.00	45.90
2122.50	H	52.77	-61.58	9.80	0.57	-52.35	-13.00	39.35
2122.50	V	49.25	-65.01	9.80	0.57	-55.78	-13.00	42.78
2830.00	H	47.58	-67.14	9.86	0.69	-57.97	-13.00	44.97
2830.00	V	47.73	-66.88	9.86	0.69	-57.71	-13.00	44.71
1RB, 1.4MHz, QPSK, Frequency: 715.3 MHz								
139.63	H	47.31	-62.96	0.00	0.35	-63.31	-13.00	50.31
79.66	V	51.74	-53.34	-0.17	0.26	-53.77	-13.00	40.77
1430.60	H	48.68	-67.41	8.80	0.38	-58.99	-13.00	45.99
1430.60	V	47.35	-68.50	8.80	0.38	-60.08	-13.00	47.08
2145.90	H	50.35	-64.20	9.77	0.58	-55.01	-13.00	42.01
2145.90	V	48.82	-65.59	9.77	0.58	-56.40	-13.00	43.40
2861.20	H	47.17	-67.37	9.92	0.70	-58.15	-13.00	45.15
2861.20	V	47.28	-67.31	9.92	0.70	-58.09	-13.00	45.09

LTE Band 66 (30MHz-18GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1RB, 1.4MHz, QPSK, Frequency: 1710.7 MHz								
139.22	H	47.82	-62.47	0.00	0.35	-62.82	-13.00	49.82
79.91	V	51.28	-53.92	-0.05	0.26	-54.23	-13.00	41.23
3421.40	H	58.69	-54.18	10.54	0.72	-44.36	-13.00	31.36
3421.40	V	61.43	-51.44	10.54	0.72	-41.62	-13.00	28.62
5132.10	H	57.62	-53.38	10.74	0.95	-43.59	-13.00	30.59
5132.10	V	59.14	-51.27	10.74	0.95	-41.48	-13.00	28.48
1RB, 1.4MHz, QPSK, Frequency:1745 MHz								
139.09	H	47.36	-62.93	0.00	0.35	-63.28	-13.00	50.28
79.42	V	51.39	-53.58	-0.29	0.26	-54.13	-13.00	41.13
3490.00	H	60.53	-52.92	10.59	0.72	-43.05	-13.00	30.05
3490.00	V	60.87	-52.52	10.59	0.72	-42.65	-13.00	29.65
5235.00	H	61.64	-49.76	11.01	0.98	-39.73	-13.00	26.73
5235.00	V	60.48	-50.19	11.01	0.98	-40.16	-13.00	27.16
1RB, 1.4MHz, QPSK, Frequency: 1779.3 MHz								
139.16	H	47.12	-63.17	0.00	0.35	-63.52	-13.00	50.52
79.18	V	51.02	-53.84	-0.41	0.26	-54.51	-13.00	41.51
3558.60	H	61.33	-52.02	10.64	0.73	-42.11	-13.00	29.11
3558.60	V	62.48	-50.66	10.64	0.73	-40.75	-13.00	27.75
5337.90	H	62.36	-48.72	11.28	1.01	-38.45	-13.00	25.45
5337.90	V	63.57	-47.00	11.28	1.01	-36.73	-13.00	23.73

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

EXHIBIT A - EUT PHOTOGRAPHS

Please refer to the attachment 2602T23317E-RF-EXP EUT EXTERNAL PHOTOGRAPHS and
2602T23317E-RF-INP EUT INTERNAL PHOTOGRAPHS

EXHIBIT B - TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2602T23317E-RF-00A-TSP TEST SETUP PHOTOGRAPHS.

EXHIBIT C - RF EXPOSURE EVALUATION

Maximum Permissible Exposure (MPE)

Applicable Standard

According to subpart §1.1310 systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Operation Mode	Frequency (MHz)	Antenna Gain [▲]		Conducted output power including Tune-up Tolerance [▲]		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
LTE B2	1850-1910	1.84	1.53	24.0	251.19	20.00	0.076	1.0
LTE B4	1710-1755	3.16	2.07	23.0	199.53	20.00	0.082	1.0
LTE B5	824-849	-1.04	0.79	24.0	251.19	20.00	0.039	0.5
LTE B12	699-716	-2.34	0.58	24.0	251.19	20.00	0.029	0.5
LTE B66	1710-1780	3.16	2.07	23.0	199.53	20.00	0.082	1.0

Note:

The Antenna Gain and Conducted output power including Tune-up Tolerance provided by manufacturer.

WWAN each band can't transmit simultaneously.

Result: Compliant. The devices meet FCC MPE at 20 cm distance.

Exemption Limits For Routine Evaluation-RF Exposure Evaluation

Applicable Standard

RSS-102, Issue 6, Clause 6.6:

Field reference level (FRL) exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm (i.e. mobile devices), except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain [▲]	Conducted output power including Tune-up Tolerance [▲]	EIRP		Exemption limits (mW)
		(dBi)	(dBm)	(dBm)	(mW)	
LTE B2	1850-1910	1.84	24.0	25.84	383.71	2239
LTE B4	1710-1755	3.16	23.0	26.16	413.05	2122
LTE B5	824-849	-1.04	24.0	22.96	197.70	1288
LTE B12	699-716	-2.34	24.0	21.66	146.55	1151
LTE B66	1710-1780	3.16	23.0	26.16	413.05	2122

Note: The Antenna Gain and Conducted output power including Tune-up Tolerance provided by manufacturer.

WWAN each band can't transmit simultaneously.

Result: So the device is compliance with the exemption from Routine Evaluation Limits –RF exposure Evaluation.

***** END OF REPORT *****