Test Report

Test Report No.: CQC-IVTS-2023-0131-E1

Product Name FoldSat LEo Ku OW

Model Number INSTER_RA01

Applicant Inster Tecnologia y Comunicaciones

Approval Types FCC ID: 2BDHJINSRA01

CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.

National Quality Inspection and Testing Center for Internet of Vehicles Products

TEST REPORT DECLARATION

Equipment under Test	:	**FoldSat LEo Ku OW**
Model /Type	:	INSTER_RA01
Listed Models	:	N/A
Applicant	:	**Inster Tecnologia y Comunicaciones**
Address	:	Av. Rita Levi Montalcini, 2, Tecnogetafe, Madrid, Spain
Manufacturer	:	**Inster Tecnologia y Comunicaciones**
Address	:	Av. Rita Levi Montalcini, 2, Tecnogetafe, Madrid, Spain

The EUT described above is tested by CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd. to determine the maximum emissions from the EUT. CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd. is assumed full responsibility for the accuracy of the test results.

Project Engineer:	Yankun Wang (Yankun Wang 王炎坤)	Date: 2023-11-27
Checked by:	Haohao Li (Haohao Li 李昊昊)	Date: 2023-11-27
Approved by:	Wenliang Li (Wenliang Li 李文亮)	Date: 2023-11-27

Contents

1. TEST STANDARDS

The tests were performed according to following standards: The equipment under test (EUT) has been tested at CQC-IVTS's (own or subcontracted) laboratories according to the leading reference documents giving table below:

No	Identify	Document Title	Version/Date
1	FCC Part 25	Satellite Communications	11/22/2023
2	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014
3	ANSI C63.10	American National Standard for Testing Unlicensed Wireless Devices	2013
4	ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Lincensed Radio Services	2015

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	November 16, 2023
Testing commenced on	:	November 16, 2023
Testing concluded on	:	November 26, 2023

2.2. Product Description*

Product Name:	FoldSat LEo Ku OW
Trade Mark	FoldSat LEo Ku OW
Model/Type reference:	INSTER_RA01
FCC ID:	2BDHJINSRA01
Hardware Version:	INSTER/R
Software Version:	1.1.5
Frequency Band:	RX: 10.7 – 12.7 GHz TX: 14.0 – 14.5 GHzs
Transmitter Output Power Conducted:	4.60 dBm / 20 MHz (average power, single carrier)
Transmitter Output Power Radiated:	dBm / 20 MHz (average power, single carrier)
Modulation Type:	TX: QPSK, 8PSK, 16QAM RX: QPSK, 8PSK, 16APSK
Type of Radio Transmision:	FDMA
Channel Spacing:	TX: 20 MHz; RX: 250 MHz
Emission Designator:	D7W; G7W
Number of Channels Bandwidth:	TX_Single Carrier (Bandwidth: 18 MHz): 1
Authorized Bandwidth:	19.8 MHz (Single Carrier)
Maximun Occupied Bandwidth:	MHz
Antenna:	Electronically scanned array
Antenna Gain:	75.00 dBi at middle band
Power Supply:	AC 100 – 240 V; 50/60 Hz 24 V DC at modem input
Temperature Range:	-25℃ to +55℃
Difference Declaration	n/a

*: declared by the applicant. CQC-IVTS not responsible for accuary.

2.3. EUT Operation Mode*

EUT operating mode no	Description of operating modes	Additional information
op. 1	Continuously transmitting and receiving mode	QPSK modulation (normal mode). 14.0525 GHz, a continuous wave with 100% duty cycle
op. 2	Continuously transmitting and receiving mode	8PSK modulation (normal mode). 14.0525 GHz, a continuous wave with 100% duty cycle
op. 3	Continuously transmitting and receiving mode	16QAM modulation (normal mode). 14.0525 GHz, a continuous wave with 100% duty cycle
op. 4	Continuously transmitting and receiving mode	Carrier modulation (normal mode). 14.0525 GHz, a continuous wave with 100% duty cycle

Operating Modes of The Samples:
Normal Operating Mode: the porduct can support the following channel plan.

Channel Number	Carrier	Input IF Frequency [MHz]	LO [MHz]	RF Output Frequency [MHz] [Bandwidth: 19.8 MHz]
1	1	4112.5	25	14052.50

a) The EUT was operated in the special Test Mode (Satellite Code Stream provided by applicant and installed in Vector Signal Genertor SMW200A), continuoustly transmitting the modulated RF signals without an off-time interval. The tests were performed regardless of the burst duration.

b) Test tests performed for each Bandwidth and Modulation at the following frequencies:
TX signle carrier (19.8 MHz BW)
14.0525 GHz Channel Number + Carrier
c) CW carrier activated for the measurement of frequency stability
*: declared by the applicant

2.4. Modifications

No modifications were implemented to meet testing criteria

2.5. List of Components*

No.	Equipment	Manufactuer	Model Name	(Version, model/part number)	Series Number	Note No.	Tested (Yes/No)
1	CNX Broadband Modem	Hughes	SSM v2 (CMM)	1507987-0002	SN20: DBAM221EF4		Yes
2	Antenna Tx Unit	Inster	Ku Band Phased Array 800-Element transmitting	236000364	SN20: 2301M001109		Yes
3	Antenna Rx Unit	Inster	Ku Band Phased Array 752-Element Receiving	236000365	SN20:K2670130		No
4	RCM	Rapidtek	RPC-R14I4V2-DC	231302337	SN20: 230024		Yes
5	AC Power Adaptor	MEAN WELL	HEP-240-24A	Input: 85-264VAC 47-63Hz 1,3A Output: 24VDC 10A	N/A		Yes

*: declared by the applicant.

2.6. Auxiliary Equipment (AE) Description

AE short designation	EUT Name (if available)	EUT Description	Serial number (if available)	Software (if used)
AE 1	Thinkbook 14 G3	PC	MP2BCZ2N	-/-
AE 2	RF Cable (*2)	Length: 1m	-/-	-/-
AE 3	RF Cable (*1)	Length: 0.5m	-/-	-/-
AE4	PD-0.516-2S	2-Way Power Divider	62315	-/-

*: declared by the test lab.

2.7. Test Item Set-ups Description

set. 1	EUT A + AE 1 + AE2 + AE3 + AE4	EUT operating mode 1
set. 2	EUT A + AE 1 + AE2 + AE3 + AE4	EUT operating mode 2
set. 3	EUT A + AE 1 + AE2 + AE3 + AE4	EUT operating mode 3
set. 4	EUT A + AE 1 + AE2 + AE3 + AE4	EUT operating mode 4

2.8. Test Conditions*

Temperature, [°C]		Voltage, [V]	
T_{nom}	+25.0	V_{nom}	AC 120 V
T_{min}	-25.0	V_{min}	AC 138 V
T_{max}	+55.0	V_{max}	AC 102 V

*: declared by the applicant

2.9. Additional Information

Test items differences	None
Additional application considerations to test a component or sub-assembly	Laptop with test software

2.10. Test Location

Location 1

Company:	CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.
Address:	Building G5, TCL International E City, Xili Street, Nanshan District, Shenzhen, China
Post code:	518112
Contact Person:	Wenliang Li
Telephone:	+86-755-8618 9654
e-Mail:	liwenliang@cqc.com.cn

2.11. Abnormalities from Standard Conditions

None

2.12. Possible Verdicts of The Results

Test sample meets the requirements	P (PASS) ± the measured value is below the acceptance limit, AL = TL
Test sample does not meet the requirements	F (FAIL) ± the measured value is above the acceptance limit, AL = TL
Test case does not apply to the test sample	N/A (Not applicable)
Test case not performed	N/P (Not performed)

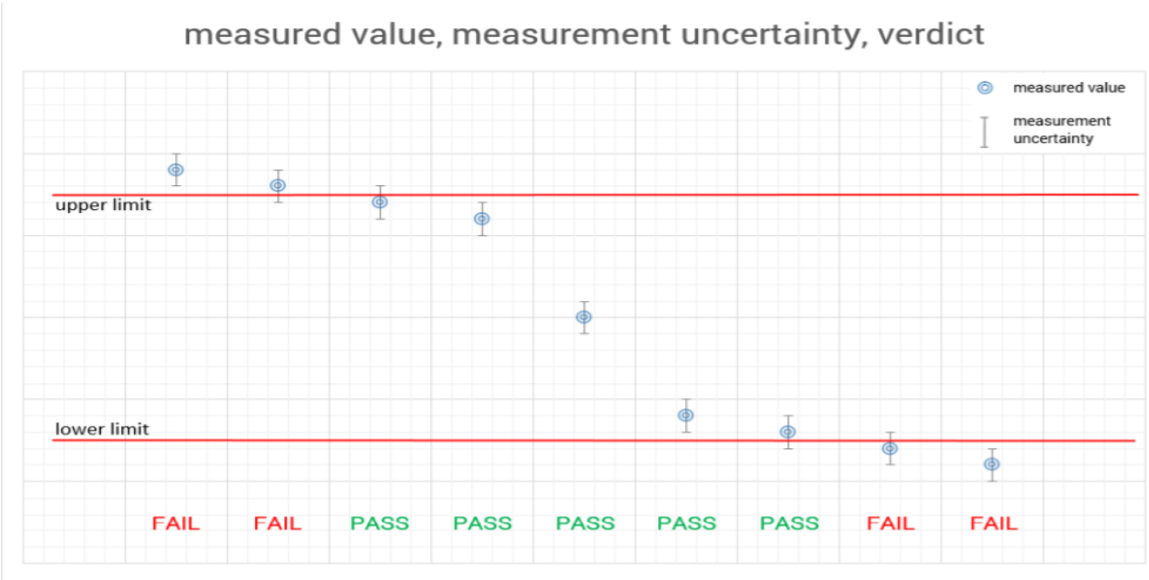
2.13. Formula for Determination of Correction Values (E_C)

$E_C = E_R + AF + C_L + D_F - G_A$ (1)
$M = L_T - E_C$ (2)

E_C = Electrical field ± corrected value
E_R = Receiver reading
M = Margin
L_T = Limit
AF = Antenna factor
C_L = Cable loss
D_F = Distance correction factor (if used)
G_A = Gain of pre-amplifier (if used)
All units are dB-units, positive margin means value is below limit.

2.14. Reporting Statements of Conformity – Decision Rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed. The measurement uncertainty is mentioned in this test report, see chapter 9, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."

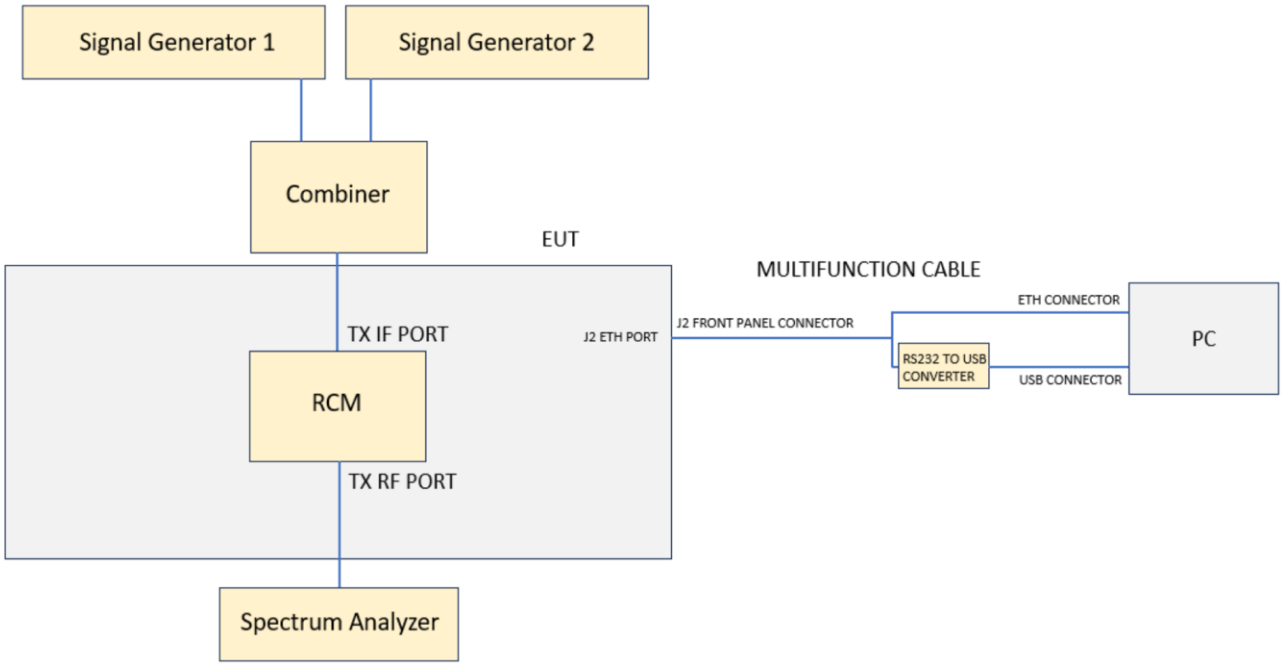


2.15. Radiated Emission Measurement Distance

The measurement antenna is in the far field of the EUT per formula $2D^2/\lambda$, where D is the larger between the dimension of the measurement antenna and the transmitting antenna of the EUT. In this case, "D" is the largest dimension of the measurement antenna. The EUT is manipulated through all orthogonal planes representative of its typical use and for both polarities of the measurement antenna in order to achieve the highest signal level. The worst-case position found was used for all radiated testing.

Frequency Range [GHz]	Wavelength [centimetres]	Far Field Distance [meters]	Measurement Distance [meters]
18 – 40	0.750	0.65	1.00
40 – 60	0.522	0.97	1.00
60 – 90	0.322	0.69	1.00
90 – 140	0.210	0.52	1.00
140 – 220	0.148	0.37	1.00
220 – 325	0.101	0.24	1.00

2.16. Test Configuration (Arrangement of EUT)



[Remark: if measurement frequency range over spectrum analyzer covered, using external Harmonic Mixer to extend frequency range]

2.17. Antenna Characteristics

Following information is derived from documents “Antenna Specification” provided by applicant.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.
Building G5, TCL International E City, Xili Street, Nanshan District, Shenzhen, China
CQC-IVTS A2LA Certification Number: 6645.01;

3.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	20°C
Lative Humidity	55 %
Air Pressure	989 hPa

3.3. Test Description

Test Specification Clause	Test Case	Temperature Condition	Power Supply	PASS	FAIL	NA	NP	Results
§ 2.1046 § 25.218	RF Power Output / Off-axis EIRP Spectral Density	Nominal	Nominal	☒	☐	☐	☐	
§ 2.1046 § 25.204	RF Power Output / Power Limits	Nominal	Nominal	☒	☐	☐	☐	
§ 2.1049	Occupied bandwidth (99%)	Nominal	Nominal	☒	☐	☐	☐	
§ 2.1051 § 25.202	Spurious Emissions at Antenna Terminals / Emission Limitations (Conducted Emissions)	Nominal	Nominal	☒	☐	☐	☐	
§ 2.1053 § 25.202	Field Strength of Spurious Radiation / Emission Limitations (Radiated Emissions)	Nominal	Nominal	☒	☐	☐	☐	
§2.1055 § 25.202	Frequency Stability	Nominal Extreme	Nominal Extreme	☒	☐	☐	☐	

Note 1: NA means “not applicable”; NP means Not Performed;
Note 2: The measurement uncertainty is not included in the test result.

3.4. Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01” Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1” and TR-100028-02 “Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 “ and is documented in the CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd..quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQC Internet of Vehicles Technical Service (Shenzhen) Co., Ltd.:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.90 dB	(1)
Radiated Emission	1~6GHz	4.20 dB	(1)
Radiated Emission	6~18GHz	4.50 dB	(1)
Radiated Emission	18-40GHz	5.42 dB	(1)
Radiated Emission	Above 40 GHz	5.50 dB	(1)
Conducted Disturbance	0.15~30MHz	3.30 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Equipments Used during the Test

Radiated Emission						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	EMI Test Receiver	R&S	ESW26	103003	2023/06/20	2023/06/19
2	Spectrum Analyzer	R&S	FSW43	10182	2023/06/20	2023/06/19
3	Ultra-Broadband Antenna	Schwarzbeck	VULB9168	1291	2021/09/05	2024/09/04
4	Horn Antenna	ETS-Lindgren	3117	102732	2021/09/05	2024/09/04
5	Amplifier	R&S	SCU01F	100369	2023/06/20	2023/06/19
6	Amplifier	R&S	SCU18F	100868	2023/06/20	2023/06/19
7	Amplifier	R&S	SCU26F	100781	2023/06/20	2023/06/19
8	Amplifier	R&S	SCU40F	102713	2023/06/20	2023/06/19
8	Horn Antenna	A-INFO	LB-180500H-2.4F	2110081000089	2021/09/05	2024/09/04
9	EMI Test Software	R&S	EMC32	N/A	N/A	N/A
10	TC-RX60	Tonscond	Receive Unit	1551	N/A	N/A
11	TC-RX90	Tonscond	Receive Unit	1552	N/A	N/A
12	Harmonic Mixer (40 GHz – 60 GHz)	Ceyear	82407NA	1194643	2023/06/20	2023/06/19
13	Harmonic Mixer (60 GHz – 90 GHz)	Ceyear	82407NA	1178931	2023/06/20	2023/06/19
14	Vector Signal Generator	R&S	SMW200A	1423	2023/06/20	2023/06/19
15	TC-RX40	Tonscond	Receive Unit	1543	N/A	N/A
16	Antenna Mast	Maturo	BAM4.0	N/A	N/A	N/A
17	Turntable	Maturo	TT3.5	N/A	N/A	N/A
18	Loop Antenna	R&S	HFH2-Z2E	101066	2021/09/05	2024/09/04
19	Thermal chamber	ESPEC	GFS-800-15	0050-001161	2023/07/22	2024/07/21

4. TEST CONDITIONS AND RESULTS

4.1. RF Output Power [§2.1046 & 25.218]

4.1.1. LIMITS

According to § 25.204: Power limits for earth stations

(a) In bands shared coequally with terrestrial radio communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station, other than an ESV, operating in frequency bands between 1 and 15 GHz, shall not exceed the following limits except as provided for in paragraph (c) of this section:
+ 40 dBW in any 4 kHz band for θ ≤0°
+ 40 + 3θ dBW in any 4 kHz band for 0° <θ ≤5°
where θ is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

(b) In bands shared coequally with terrestrial radiocommunication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station operating in frequency bands above 15 GHz shall not exceed the following limits except as provided for in paragraph (c) of this section: + 64 dBW in any 1 MHz band for θ ≤0°
+ 64 dBW in any 1 MHz band for θ ≤0°
+ 64 + 3 θ dBW in any 1 MHz band for 0° <θ ≤5°
where θ is as defined in paragraph (a) of this section.

(c) For angles of elevation of the horizon greater than 5° there shall be no restriction as to the equivalent isotropically radiated power transmitted by an earth station towards the horizon.

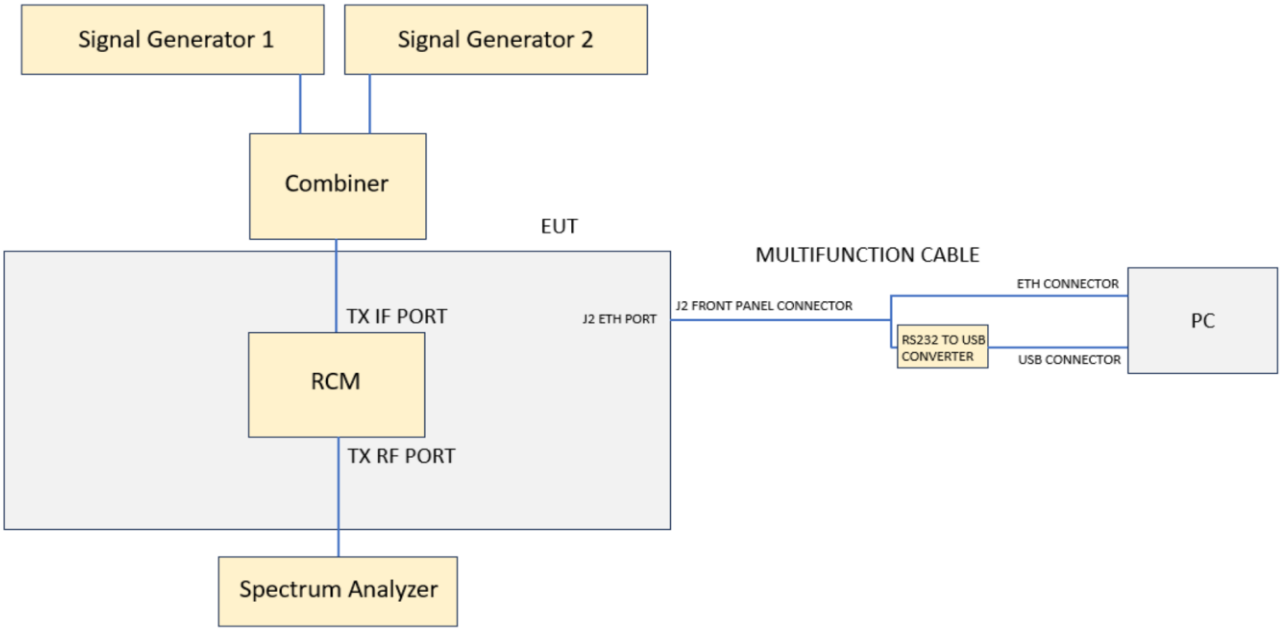
According to § 2.1046: Measurements required: RF Power Output

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033 (c) (8). The electrical characteristics of the radio frequency load attached to the output terminals.

(b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as applicable in 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

4.1.2. TEST CONFIGURATION



[Remark: if measurement frequency range over spectrum analyzer covered, using external Harmonic Mixer to extend frequency range]

4.1.3. TEST PROCEDURE

Procedure for measuring average power of a broadband signal with spectrum analyzer:
(1) Set Span to 2 times to 3 times the OBW
(2) Set RBW = 1% to 5% of the OBW
(3) Set VBW ≥3 x RBW
(4) Set number of measurements points in sweep ≥ 2 x span / RBW
(5) Set time:
  (1) Set = auto-couple, or
  (2) Set ≥ [10 x (number of points in sweep) x (tranmssion period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
(6) Detctor = power average (RMS)
(7) If the EUT can be configurated to transmit continoustly, then set the trigger to free run.
(8) If the EUT cannot be configurated to transmit continoustly, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
(9) Trace average at least 100 traces in power averaging (RMS) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symblos, it can be necessary to increase the number of trances to be averaged above 100, or is using a manually configured sweep time, increase the sweep time.
(10) Copute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edeges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

Procedure for RF power output in any 4 kHz band:
The average power spectral density was measured according to Subclause ANSI C63.26-2015 Clause 5.2.4.5. The same test prodedure for the measurements of Spurious Emission At Antenna Terminals (Out-of-Band emissions measurements) was used.

4.1.4. TEST RESULTS

Table 1: RF Output Power Values

Modulation	Carrier	Frequency [GHz]	Conducted Measurement Results			Antenna Gain [dBi]	EIRP [dBW]
			dBm	dBW	W		
QPSK	Single	14.0525	4.56	-25.44	0.0029	75.00	49.56
8PSK	Single	14.0525	4.57	-25.43	0.0029	75.00	49.57
16QAM	Single	14.0525	4.59	-25.41	0.0029	75.00	49.59

Note 1: The insertion loss (Waveguide couple, RF cable assembly) was included in the spectrum analyzer as cable loss.
Note 2: Transmitter radiated output power including the antenna gain (75.00 dBi).
Note 3: EIRP (dBm) = Conducted Power (dBm) + Antenna Gain (dBi);

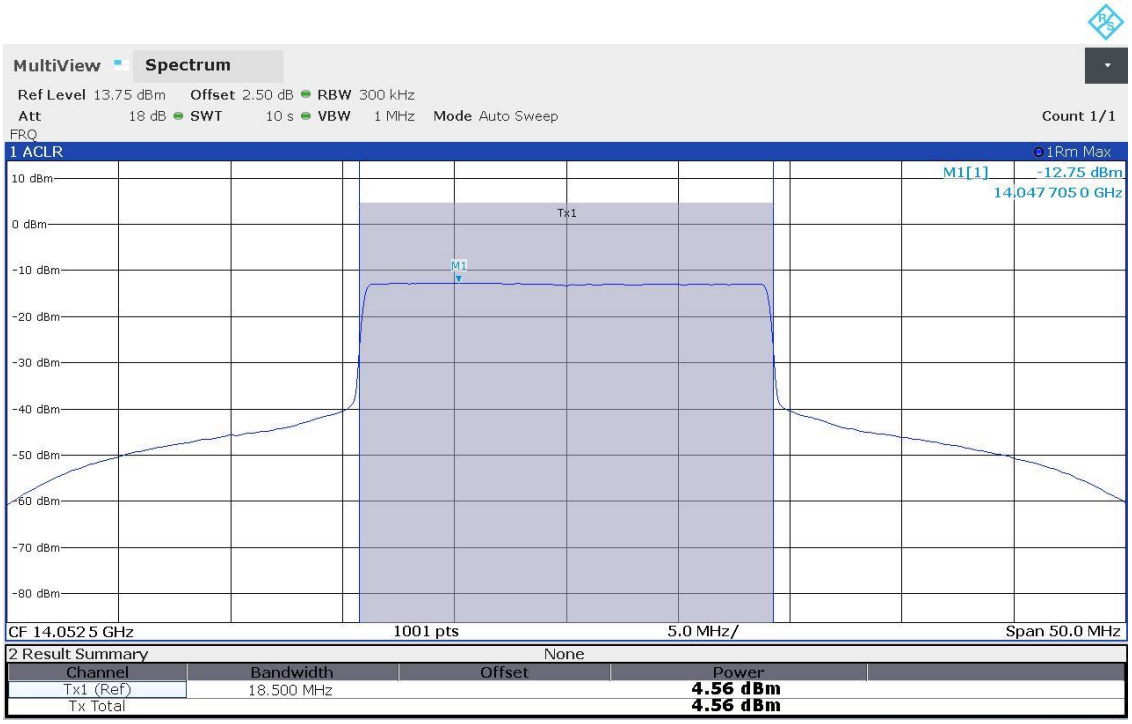
Table 2: RF Output Power Values (Measured with Spectrum Analyzer in any 4 kHz Band)

Modulation	Carrier	Frequency [GHz]	Conducted Measurement Results		Antenna Gain [dBi]	EIRP [dBW]	EIRP Limits [dBW]
			dBm	dBW			
QPSK	Single	14.0525	-31.59	-61.59	75.00	13.41	40.00
8PSK	Single	14.0525	-31.26	-61.26	75.00	13.74	40.00
16QAM	Single	14.0525	-31.06	-61.06	75.00	13.94	40.00

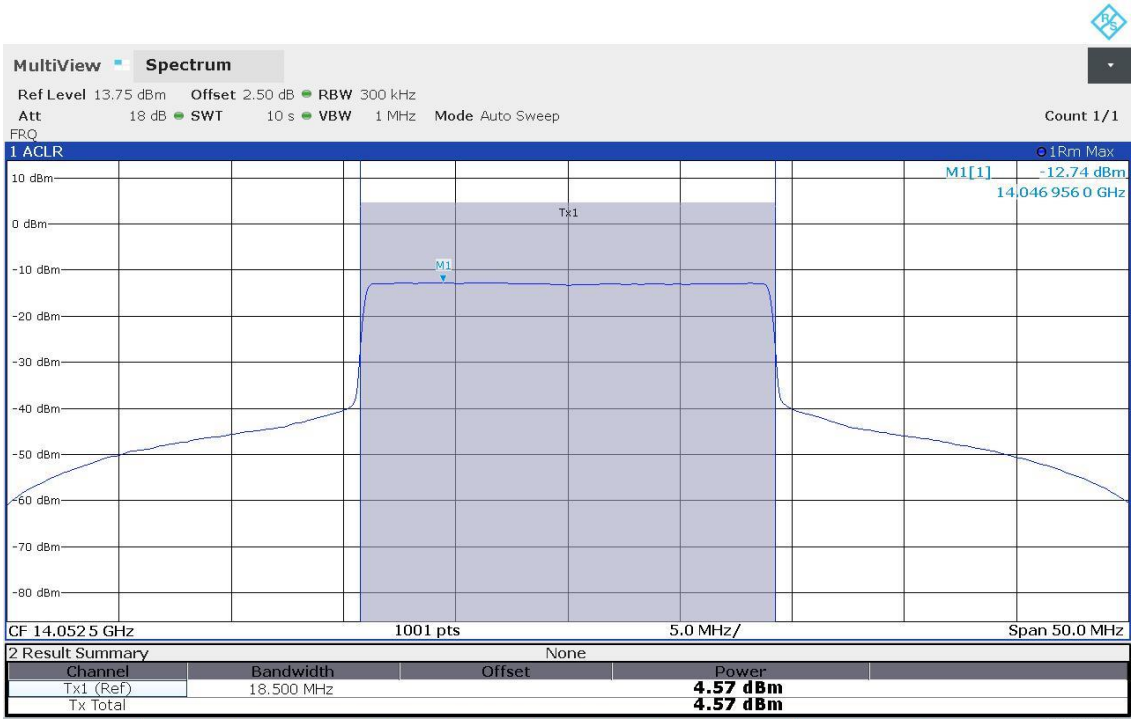
Note 1: The insertion loss (Waveguide couple, RF cable assembly) was included in the spectrum analyzer as cable loss.
Note 2: Transmitter radiated output power including the antenna gain (75.00 dBi).
Note 3: Bandwidth correction factor ($10 \times \log_{10}$ (4 kHz / 3 kHz) = 1.25 dB)) was applied to the Offset (Plus insertion loss).
Note 4: Assume θ ≤0°.

Note 5: Refer to Spurious Emission at Antenna Terminals (Out-of-Band emissions measurements) measurement plots.
Note 6: EIRP (dBm) = Conducted Power (dBm) + Antenna Gain (dBi);

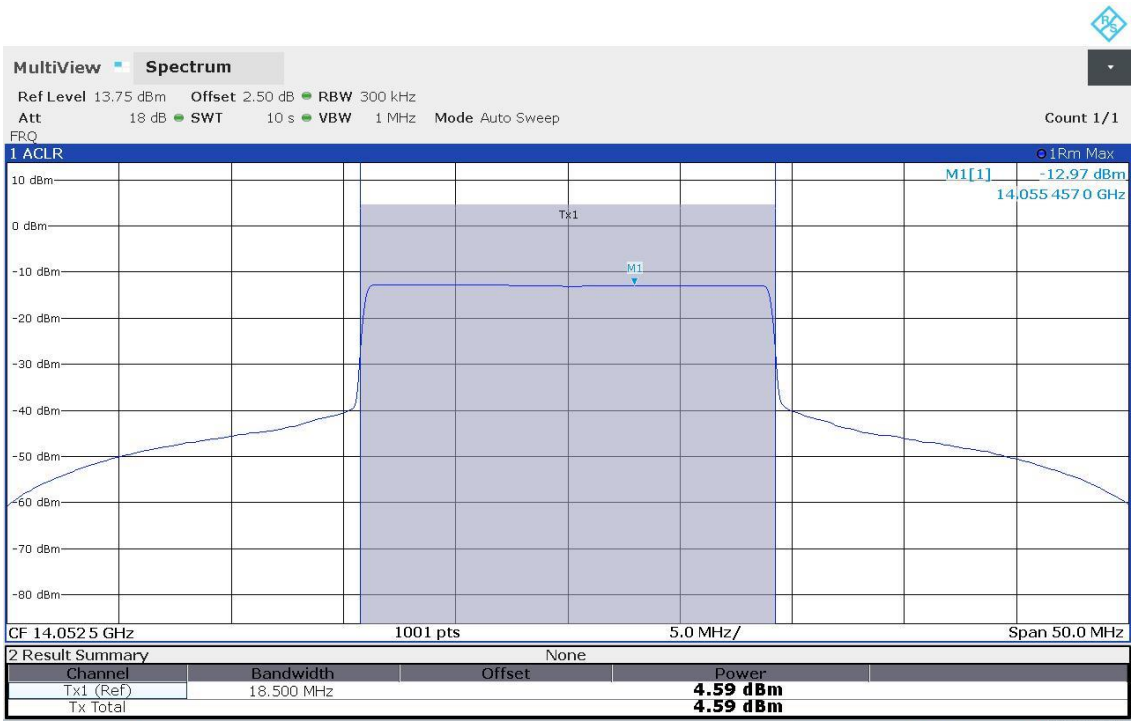
Plots No. 1: Conducted Average Power, RMS detector / Channel Power / QPSK Modulation



Plots No. 2: Conducted Average Power, RMS detector / Channel Power / 8PSK Modulation



Plots No. 3: Conducted Average Power, RMS detector / Channel Power / 16QAM Modulation



4.2. Off-Axis EIRP Spectral Density [§2.1046 & §25.218]

4.2.1. LIMITS

According to §25.218 - Off-axis EIRP density envelopes for FSS earth stations transmitting in certain frequency bands.
(f) Digital earth station operation in the conventional Ku-band.
(1) For co-polarized transmissions in the plane tangent to the GSO arc:

$15–25\log_{10}\theta$	dBW/4 kHz	for $1.5° \le \theta \le 7°$
-6	dBW/4 kHz	for $7° < \theta \le 9.2°$
$18–25\log_{10}\theta$	dBW/4 kHz	for $9.2° < \theta \le 19.1°$
-14	dBW/4 kHz	for $19.1° < \theta \le 180°$

Where θ is as defined in paragraph (c)(1) of this section. The EIRP density levels specified for θ > 7° may be exceeded by up to 3 dB in up to 10% of the range of theta (θ) angles from ±7–180°, and by up to 6 dB in the region of main reflector spillover energy.

(2) For co-polarized transmissions in the plane perpendicular to the GSO arc:

$18–25\log_{10}\theta$	dBW/4 kHz	for $3° \le \theta \le 19.1°$
-14	dBW/4 kHz	for $19.1° < \theta \le 180°$

Where θ is as defined in paragraph (c)(1) of this section. These EIRP density levels may be exceeded by up to 6 dB in the region of main reflector spillover energy and in up to 10% of the range of θ angles not included in that region, on each side of the line from the earth station to the target satellite.

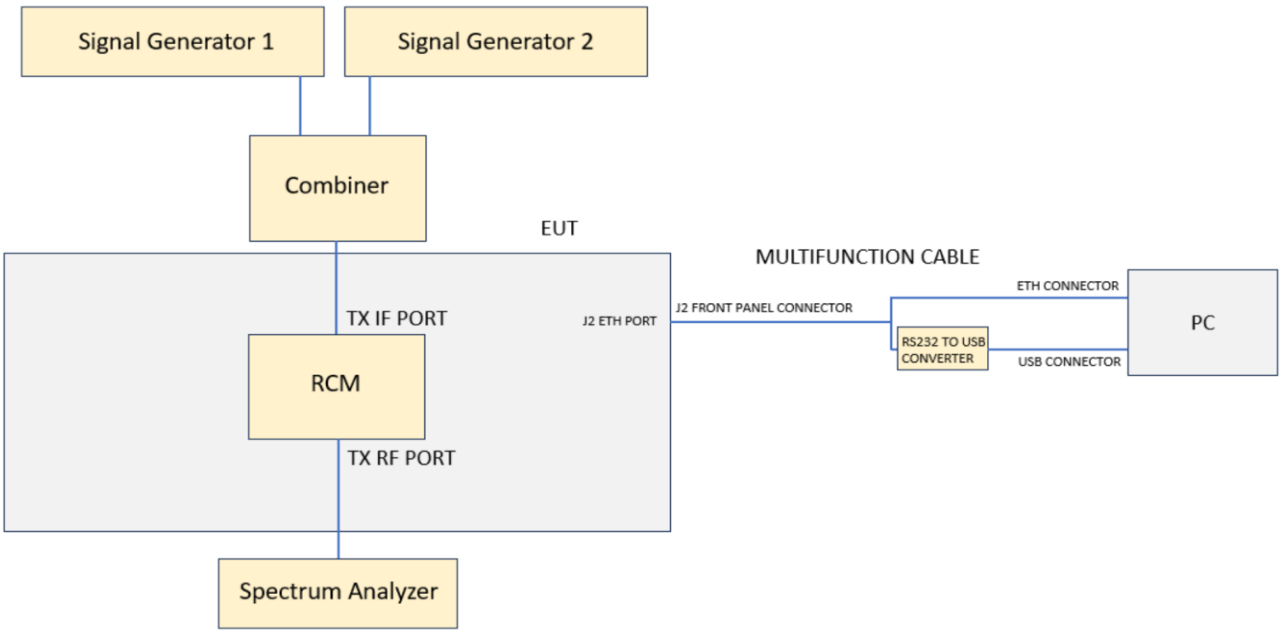
(3) For cross-polarized transmissions in the plane tangent to the GSO arc and in the plane perpendicular to the GSO arc:

$5–25\log_{10}\theta$	dBW/4 kHz	for $1.5° \le \theta \le 7°$

Where θ is as defined in paragraph (c)(1) of this section.

(4) A license application for earth station operation in a network using variable power density control of earth stations transmitting simultaneously in shared frequencies to the same target satellite receiving beam may be routinely processed if the applicant certifies that the aggregate off-axis EIRP density from all co-frequency earth stations transmitting simultaneously to the same target satellite receiving beam, not resulting from colliding data bursts transmitted pursuant to a contention protocol, will not exceed the off-axis EIRP density limits permissible for a single earth station, as specified in paragraphs (f)(1) through -(f)(3) of this section.

4.2.2. TEST CONFIGURATION



[Remark: if measurement frequency range over spectrum analyzer covered, using external Harmonic Mixer to extend frequency range]

4.2.3. TEST PROCEDURE

Procedure for Off-axis EIRP spectrum density in any 4 kHz band:
The average power spectral density was measured according to Subclause ANSI C63.26-2015 Clause 5.2.4.5.

The same test prodedure for the measurements of Spurious Emission At Antenna Terminals (Out-of-Band emissions measurements) was used.

4.2.4. TEST RESULTS

Table 3: Off-axis EIRP Spectrum Density Values (Measured with Spectrum Analyzer in any 4 kHz Band)

Modulation	Carrier	Frequency [GHz]	Conducted Measurement Results		Antenna Gain [dBi]	EIRP [dBW]	EIRP Limits [dBW]
			dBm	dBW			
QPSK	Single	14.0525	-31.10	-61.10	0	-61.10	-14.00
8PSK	Single	14.0525	-31.08	-61.08	0	-61.08	-14.00
16QAM	Single	14.0525	-31.05	-61.05	0	-61.05	-14.00

Note 1: The insertion loss (Waveguide couple, RF cable assembly) was included in the spectrum analyzer as cable loss.
Note 2: Subtracting the antenna gain values specified in §25.209 Earth station antenna performance standards from these limits, the maximum conducted Off-axis density limit is -14 dBW/4kHz.
Note 3: Bandwidth correction factor ($10 \times \log_{10}$ (4 kHz / 3 kHz) = 1.25 dB)) was applied to the Offset (Plus insertion loss).
Note: EIRP (dBm) = Conducted Power (dBm) + Antenna Gain (dBi);

Plots No. 4: Off-axis EIRP Spectrum Density, RMS detector / Power in 3 kHz / QPSK Modulation