TEST REPORT

Applicant Name :	Safe360 LLC
Address :	8148 lefferts blvd, Kew Gardens, NY 11415, United States
Report Number :	XMTN1220809-36151E-RF
FCC ID:	2A8AB911S2

Test Standard (s)

FCC PART 27; FCC PART 24E

Sample Description

Product:	Shower Alarm
Model No.:	911S2
Trademark:	Safe360
Date Received:	2022-08-09
Date of Test:	2022-08-16 to 2022-11-22
Report Date:	2022-11-22

Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Audy.Yu
EMC Engineer

Approved By:

Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	XMTN1220809-36151E-RF	Original Report	2022-11-22

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Shower Alarm
Tested Model	911S2
Radio	LTE Cat 1
Frequency Range	LTE Band 2: 1850-1910MHz(TX); 1930-1990MHz(RX) LTE Band 4: 1710-1755MHz(TX); 2110-2155MHz(RX)
Maximum Output Power (Conducted power)	LTE Band 2: 22.18dBm LTE Band 4: 22.36dBm
Modulation Technique	LTE: QPSK, 16QAM
Antenna Specification*	Internal Antenna: 0 dBi (provided by the applicant):
Voltage Range	DC 1.5V*3 AAA from battery
Sample serial number	XMTN1220809-36151E-RF-S1(RF Radiated Test) XMTN1220809-36151E-RF-S2(RF Conducted Test) (Assigned by ATC, Shenzhen)
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2-Subpart J, Part 24-Subpart E, and Subpart 27 of the Federal Communication Commission's rules.

The objective is to determine the compliance of the EUT with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability and band edge.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2-Subpart J as well as the following parts:

Part 24 Subpart E - Personal Communication Services
Part 27 - Miscellaneous Wireless Communications Services

ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
RF Frequency		$0.082*10^{-7}$
Emissions, Radiated	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

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

Test Facility

The Test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The final qualification test was performed with the EUT operating at normal mode.

The test items were performed with the EUT operating at testing mode. Test was performed with channels as below table:

Frequency band	Bandwidth (MHz)	Test Frequency(MHz)		
		Low	Middle	High
LTE B2	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 B4	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

Note: the EUT is UE Category 1 device, for 10MHz/15MHz/20MHz bandwidth, 16QAM modulation, the EUT only supported partial RB allocation, and maximum RB set is 27.

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

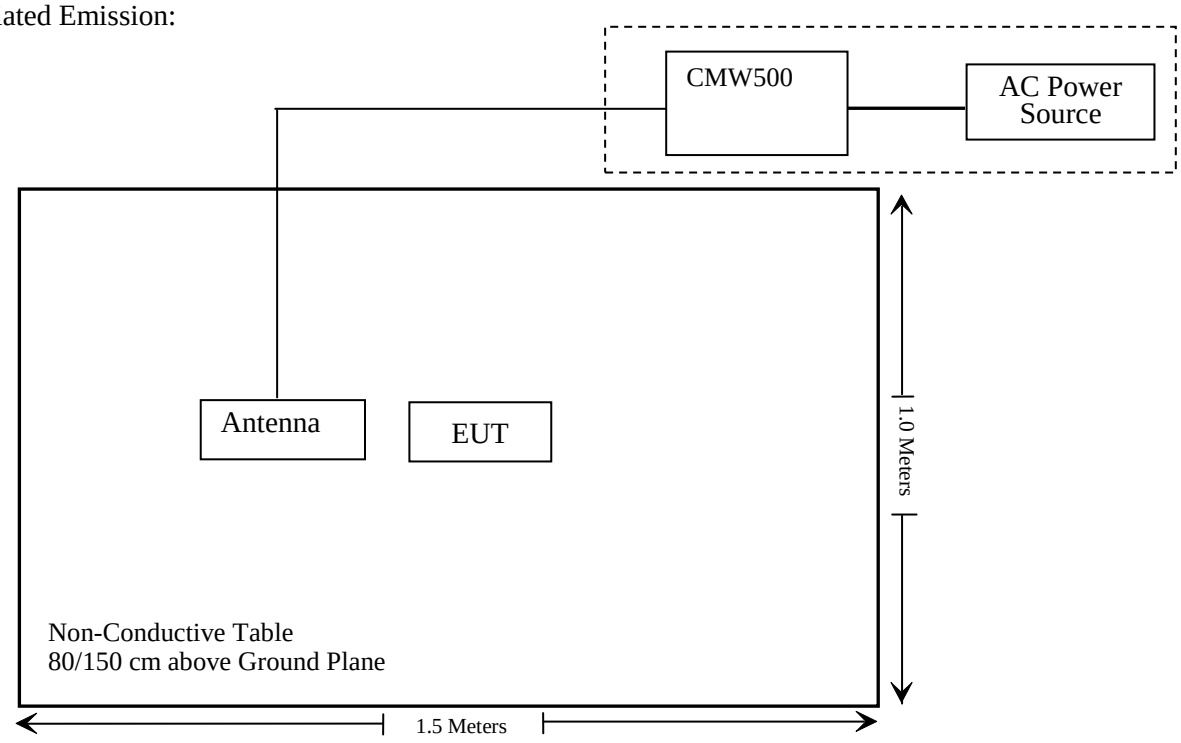
Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-116218-UY

Support Cable Description

Cable Description	Length (m)	From / Port	To
Unshielded Un-detachable AC cable	1.2	AC Power	CMW500

Block Diagram of Test Setup

For Radiated Emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§ 1.1310 & §2.1093	RF Exposure Evaluation	Compliant
§2.1046;§ 24.232 (c)(d); §27.50 (d)	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049;§ 24.238; §27.53	Occupied Bandwidth	Compliant
§ 2.1051;§ 24.238 (a); §27.53;	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliant
§ 24.238 (a); §27.53 (h)	Band Edge	Compliant
§ 2.1055; § 24.235; §27.54;	Frequency stability	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde & Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-184055 36-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Bilog Antenna	VULB9163	9163-194	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-655	2020/01/05	2023/01/04
PASTERNACK	Horn Antenna	PE9852/2F-20	1120 (ATC-BA-024-1)	2020/01/05	2023/01/04
PASTERNACK	Horn Antenna	PE9852/2F-20	1120 (ATC-BA-025-1)	2020/01/05	2023/01/04
Agilent	Signal Generator	N5183A	MY51040755	2021/12/13	2022/12/12
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.16	N650	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.16	N200	2021/12/14	2022/12/13

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101948	2021/12/13	2022/12/12
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606	2021/12/13	2022/12/12
HP	6dB Attenuator	8493B 6dB Attenuator	2708A 04769	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.31	RF-01	Each time	/
Mini-Circuits	Power Splitter	DC-18000MHz	SF10944151S	2021/12/14	2022/12/13
UNI-T	DC Power Supply	UTP8305B	10584	NCR	NCR
Fluke	Desktop Multi Meter	45	7664009	2021/12/14	2022/12/13
REALE	Temp. & Humid. Chamber	RHP-800BT	R20170318310	2021/12/14	2022/12/13

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1310 & §2.1093 – RF EXPOSURE EVALUATION

Applicable Standard

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.4 –MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

Table to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

f = frequency in MHz;
R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);

Test Result:

For worst case:

Mode	Frequency Range (MHz)	Tune-up Output Power		Antenna Gain		ERP		Evaluation Distance (m)	ERP Limit (W)
		(dBm)	(W)	(dBi)	(dBd)	(dBm)	(W)		
Band 2	1850-1910	22.5	0.178	0	-2.15	20.35	0.108	0.1	0.192
Band 4	1710-1755	22.5	0.178	0	-2.15	20.35	0.108	0.1	0.192

Note 1: The tune-up power was declared by the applicant.
Note 2: 0dBd=2.15dBi.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 10cm from nearby persons.

Result: Compliant.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), 24E & 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC § 2.1046, § 24.232 (c)(d); §27.50 (d) - RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §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.

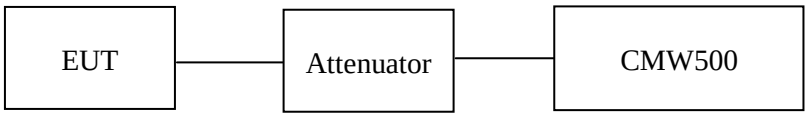
According to FCC §2.1046 and §24.232 (d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must 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.

According to §27.50(d), 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.

Test Procedure

Conducted method:

The RF output of the transmitter was connected to the CMW500 through sufficient attenuation.



Note: the path loss (cable loss and attenuator) has included in the result.

Radiated method:

ANSI C63.26-2015 Section 5.5.

Test Data

Environmental Conditions

Temperature:	21~25 ℃
Relative Humidity:	48~56 %
ATM Pressure:	101.0 kPa

The testing was performed by Jesse Chen on 2022-09-13 and 2022-11-22.

LTE Band 2

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	21.7	21.97	21.98	21.70	21.97	21.98
		RB1#3	22.05	**22.18**	21.96	22.05	22.18	21.96
		RB1#5	21.9	22.07	21.83	21.90	22.07	21.83
		RB3#0	21.95	21.82	22.1	21.95	21.82	22.10
		RB3#3	22.04	21.79	22.05	22.04	21.79	22.05
		RB6#0	20.88	20.87	20.93	20.88	20.87	20.93
	16QAM	RB1#0	20.55	20.84	21.2	20.55	20.84	21.20
		RB1#3	20.67	20.95	21.25	20.67	20.95	21.25
		RB1#5	20.56	21.16	21.37	20.56	21.16	21.37
		RB3#0	21.94	21.81	22.13	21.94	21.81	22.13
		RB3#3	22.02	21.89	22.03	22.02	21.89	22.03
		RB6#0	19.93	19.98	19.85	19.93	19.98	19.85
3.0	QPSK	RB1#0	21.81	21.71	21.93	21.81	21.71	21.93
		RB1#8	21.76	21.67	21.79	21.76	21.67	21.79
		RB1#14	21.82	21.91	21.98	21.82	21.91	21.98
		RB6#0	20.76	20.72	20.91	20.76	20.72	20.91
		RB6#9	20.71	20.79	20.84	20.71	20.79	20.84
		RB15#0	20.75	20.8	20.91	20.75	20.80	20.91
	16QAM	RB1#0	21.04	20.94	21.48	21.04	20.94	21.48
		RB1#8	20.74	20.82	21.42	20.74	20.82	21.42
		RB1#14	20.93	21.13	21.62	20.93	21.13	21.62
		RB6#0	19.69	19.76	19.89	19.69	19.76	19.89
		RB6#9	19.74	19.81	19.77	19.74	19.81	19.77
		RB15#0	19.95	19.83	19.74	19.95	19.83	19.74

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
5.0	QPSK	RB1#0	21.76	21.69	21.83	21.76	21.69	21.83
		RB1#13	21.57	21.66	21.74	21.57	21.66	21.74
		RB1#24	21.56	21.75	21.73	21.56	21.75	21.73
		RB15#0	20.71	20.66	20.9	20.71	20.66	20.90
		RB15#10	20.71	20.84	20.87	20.71	20.84	20.87
		RB25#0	20.8	20.72	21	20.80	20.72	21.00
	16QAM	RB1#0	20.56	20.3	21.15	20.56	20.30	21.15
		RB1#13	20.18	20.21	20.94	20.18	20.21	20.94
		RB1#24	20.59	20.84	21.1	20.59	20.84	21.10
		RB15#0	20.67	20.72	20.95	20.67	20.72	20.95
		RB15#10	20.67	20.82	20.92	20.67	20.82	20.92
		RB25#0	19.8	19.93	20.05	19.80	19.93	20.05
10.0	QPSK	RB1#0	21.78	21.79	22.02	21.78	21.79	22.02
		RB1#25	21.7	21.98	22.08	21.70	21.98	22.08
		RB1#49	22.16	21.76	21.99	22.16	21.76	21.99
		RB25#0	20.88	20.74	20.92	20.88	20.74	20.92
		RB25#25	20.89	20.93	21.09	20.89	20.93	21.09
		RB50#0	20.92	20.75	21.06	20.92	20.75	21.06
	16QAM	RB1#0	20.6	21.18	21.42	20.60	21.18	21.42
		RB1#14	20.64	21.38	21.64	20.64	21.38	21.64
		RB1#26	20.64	21.05	21.54	20.64	21.05	21.54
		RB15#0	20.83	20.9	20.85	20.83	20.90	20.85
		RB15#12	20.85	20.92	20.91	20.85	20.92	20.91
		RB27#0	20.87	20.7	20.89	20.87	20.70	20.89

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
15.0	QPSK	RB1#0	21.61	22.04	21.83	21.61	22.04	21.83
		RB1#38	21.61	21.79	21.77	21.61	21.79	21.77
		RB1#74	21.62	21.75	21.97	21.62	21.75	21.97
		RB36#0	20.78	20.74	20.95	20.78	20.74	20.95
		RB36#39	20.99	20.84	20.92	20.99	20.84	20.92
		RB75#0	20.98	20.76	20.89	20.98	20.76	20.89
	16QAM	RB1#0	20.79	21.06	21.26	20.79	21.06	21.26
		RB1#14	20.85	21.07	21.64	20.85	21.07	21.64
		RB1#26	20.83	21.86	21.27	20.83	21.86	21.27
		RB15#0	20.84	20.59	21.24	20.84	20.59	21.24
		RB15#12	20.45	21	21.26	20.45	21.00	21.26
		RB27#0	20.88	20.84	20.91	20.88	20.84	20.91
20.0	QPSK	RB1#0	21.84	21.72	22.01	21.84	21.72	22.01
		RB1#50	21.85	22.1	21.94	21.85	22.10	21.94
		RB1#99	21.92	21.73	21.82	21.92	21.73	21.82
		RB50#0	21.06	20.85	20.86	21.06	20.85	20.86
		RB50#50	20.94	20.87	20.87	20.94	20.87	20.87
		RB100#0	20.96	20.85	21.02	20.96	20.85	21.02
	16QAM	RB1#0	21.68	21.22	20.9	21.68	21.22	20.90
		RB1#14	21.68	21.45	20.44	21.68	21.45	20.44
		RB1#26	21.5	21.47	20.28	21.50	21.47	20.28
		RB15#0	21.59	21.11	20.91	21.59	21.11	20.91
		RB15#12	21.39	21.47	20.95	21.39	21.47	20.95
		RB27#0	20.86	20.75	20.88	20.86	20.75	20.88

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi)
For Band2: Antenna Gain = 0dBi
Limit: EIRP≤33dBm

LTE Band 4

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	21.75	21.89	22.09	21.75	21.89	22.09
		RB1#3	21.76	22.06	22.36	21.76	22.06	22.36
		RB1#5	21.72	22.11	22.29	21.72	22.11	22.29
		RB3#0	21.86	22.2	22.04	21.86	22.20	22.04
		RB3#3	21.92	22.12	22.03	21.92	22.12	22.03
		RB6#0	20.89	21.08	21.16	20.89	21.08	21.16
	16QAM	RB1#0	21.01	20.65	21.18	21.01	20.65	21.18
		RB1#3	21.24	20.53	21.37	21.24	20.53	21.37
		RB1#5	21.2	20.73	21.18	21.20	20.73	21.18
		RB3#0	21.96	21.97	22.07	21.96	21.97	22.07
		RB3#3	21.86	22.01	22.13	21.86	22.01	22.13
		RB6#0	19.84	19.97	20.21	19.84	19.97	20.21
3.0	QPSK	RB1#0	22.11	21.92	22.14	22.11	21.92	22.14
		RB1#8	21.76	21.94	22.16	21.76	21.94	22.16
		RB1#14	21.97	22.07	22.32	21.97	22.07	22.32
		RB6#0	20.86	20.99	20.93	20.86	20.99	20.93
		RB6#9	20.76	20.84	21.1	20.76	20.84	21.10
		RB15#0	20.86	20.94	21.04	20.86	20.94	21.04
	16QAM	RB1#0	20.46	21.22	21.43	20.46	21.22	21.43
		RB1#8	20.38	21.16	21.62	20.38	21.16	21.62
		RB1#14	20.45	21.25	21.7	20.45	21.25	21.70
		RB6#0	19.7	19.91	20.07	19.70	19.91	20.07
		RB6#9	19.68	19.87	20.17	19.68	19.87	20.17
		RB15#0	19.96	20.04	20.12	19.96	20.04	20.12

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
5.0	QPSK	RB1#0	21.79	21.98	21.97	21.79	21.98	21.97
		RB1#13	21.93	22.02	22.1	21.93	22.02	22.10
		RB1#24	21.69	21.98	22.32	21.69	21.98	22.32
		RB15#0	20.95	21.09	21.12	20.95	21.09	21.12
		RB15#10	20.91	21.06	21.22	20.91	21.06	21.22
		RB25#0	20.93	21.12	21.21	20.93	21.12	21.21
	16QAM	RB1#0	20.56	20.7	21.23	20.56	20.70	21.23
		RB1#13	20.48	20.68	21.27	20.48	20.68	21.27
		RB1#24	20.52	20.75	21.44	20.52	20.75	21.44
		RB15#0	20.9	21.11	20.98	20.90	21.11	20.98
		RB15#10	20.84	21.05	21.19	20.84	21.05	21.19
		RB25#0	20.07	20.12	20.11	20.07	20.12	20.11
10.0	QPSK	RB1#0	21.82	22.03	22.04	21.82	22.03	22.04
		RB1#25	21.82	22.26	22.16	21.82	22.26	22.16
		RB1#49	22.14	21.91	22.17	22.14	21.91	22.17
		RB25#0	20.97	21.02	20.83	20.97	21.02	20.83
		RB25#25	20.82	21	21	20.82	21.00	21.00
		RB50#0	20.87	21.08	20.92	20.87	21.08	20.92
	16QAM	RB1#0	21.06	21.34	21.28	21.06	21.34	21.28
		RB1#14	20.67	21.61	21.41	20.67	21.61	21.41
		RB1#26	20.89	20.9	21.73	20.89	20.90	21.73
		RB15#0	20.88	20.97	20.85	20.88	20.97	20.85
		RB15#12	20.91	20.97	21.04	20.91	20.97	21.04
		RB27#0	20.94	21	20.78	20.94	21.00	20.78

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
15.0	QPSK	RB1#0	21.67	21.89	21.81	21.67	21.89	21.81
		RB1#38	21.72	21.84	21.76	21.72	21.84	21.76
		RB1#74	21.89	21.85	21.89	21.89	21.85	21.89
		RB36#0	20.82	20.91	20.99	20.82	20.91	20.99
		RB36#39	20.91	20.91	20.92	20.91	20.91	20.92
		RB75#0	20.84	20.87	20.83	20.84	20.87	20.83
	16QAM	RB1#0	20.83	21.05	21.53	20.83	21.05	21.53
		RB1#14	20.87	21.11	21.2	20.87	21.11	21.20
		RB1#26	20.89	21.07	21.66	20.89	21.07	21.66
		RB15#0	20.13	21.35	21.36	20.13	21.35	21.36
		RB15#12	20.94	21.13	22.01	20.94	21.13	22.01
		RB27#0	20.79	20.97	20.87	20.79	20.97	20.87
20.0	QPSK	RB1#0	21.63	21.9	21.94	21.63	21.90	21.94
		RB1#50	21.92	22.11	21.85	21.92	22.11	21.85
		RB1#99	22.11	21.7	**22.36**	22.11	21.70	22.36
		RB50#0	20.85	20.8	20.96	20.85	20.80	20.96
		RB50#50	21	20.89	20.9	21.00	20.89	20.90
		RB100#0	20.85	20.97	20.81	20.85	20.97	20.81
	16QAM	RB1#0	21.29	21.29	20.93	21.29	21.29	20.93
		RB1#14	21.6	21.46	20.76	21.60	21.46	20.76
		RB1#26	21.9	20.72	20.85	21.90	20.72	20.85
		RB15#0	21.34	20.77	20.8	21.34	20.77	20.80
		RB15#12	21.74	21.45	20.79	21.74	21.45	20.79
		RB27#0	20.97	20.91	20.94	20.97	20.91	20.94

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi)
For Band4: Antenna Gain =0dBi
Limit: EIRP≤30dBm

Peak-to-average ratio (PAR)

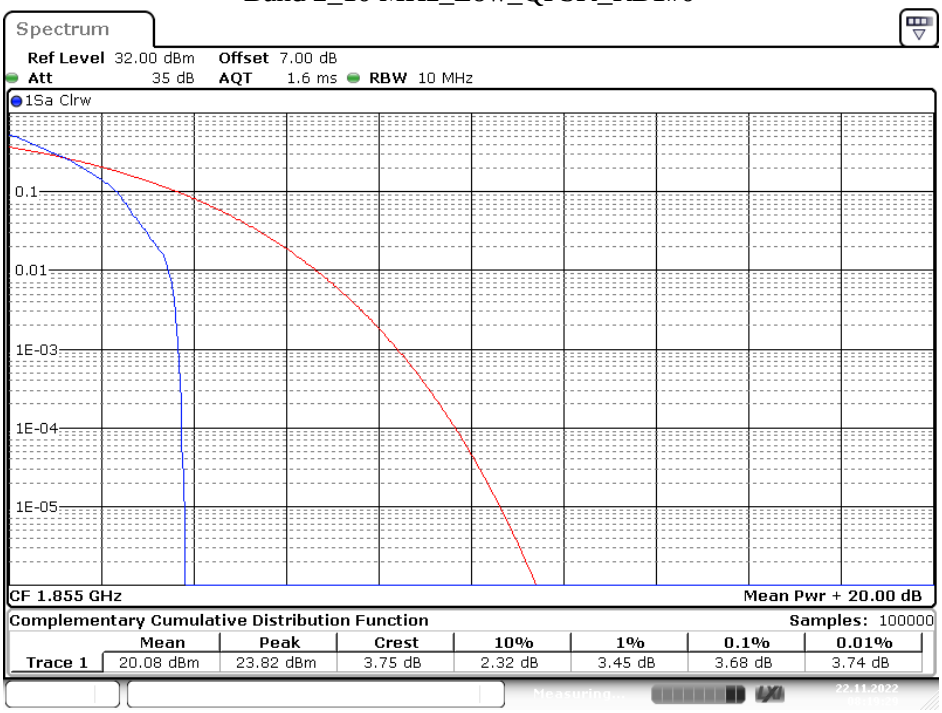
Part 24E_Band 2 (1850-1910 MHz) worst case 10MHz bandwidth

Modulation	RB	Low channel (dB)	Middle channel (dB)	High channel (dB)	Limit (dB)
QPSK	RB1#0	3.68	4.43	4.43	13
	RB50#0	4.26	4.75	4.99	
16QAM	RB1#0	4.67	5.51	4.55	
	RB27#0	4.12	4.70	5.25	

Part 27_Band 4 (1710-1755 MHz) worst case 10MHz bandwidth

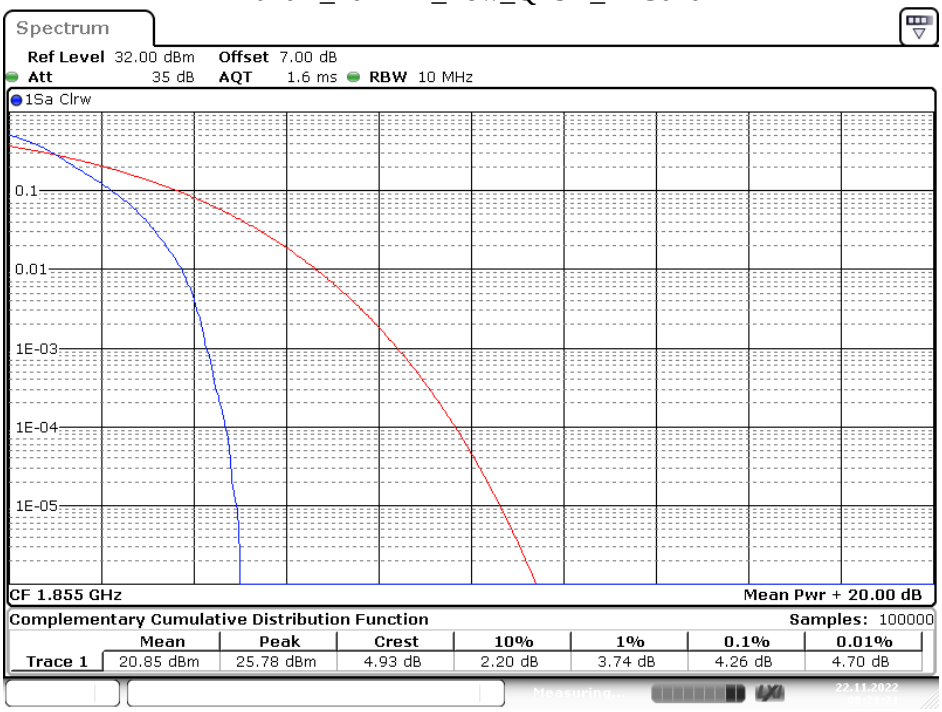
Modulation	RB	Low channel (dB)	Middle channel (dB)	High channel (dB)	Limit (dB)
QPSK	RB1#0	4.20	4.49	4.29	13
	RB50#0	4.78	4.72	4.72	
16QAM	RB1#0	5.10	5.13	4.81	
	RB27#0	4.64	4.90	4.72	

Band 2_10 MHz_Low_QPSK_RB1#0



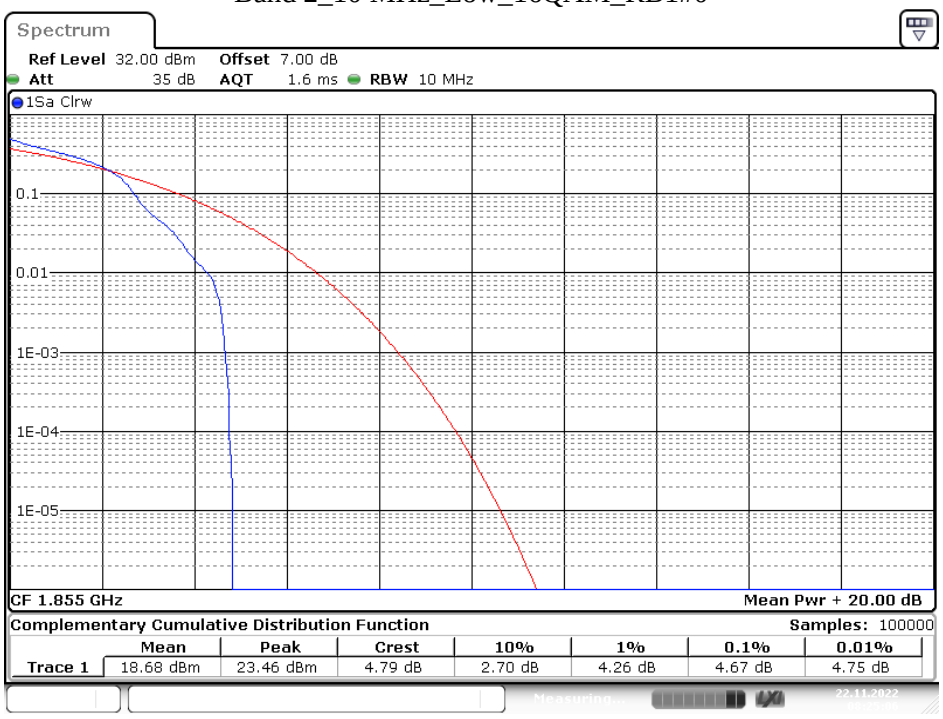
Date: 22.NOV.2022 08:19:29

Band 2_10 MHz_Low_QPSK_RB50#0



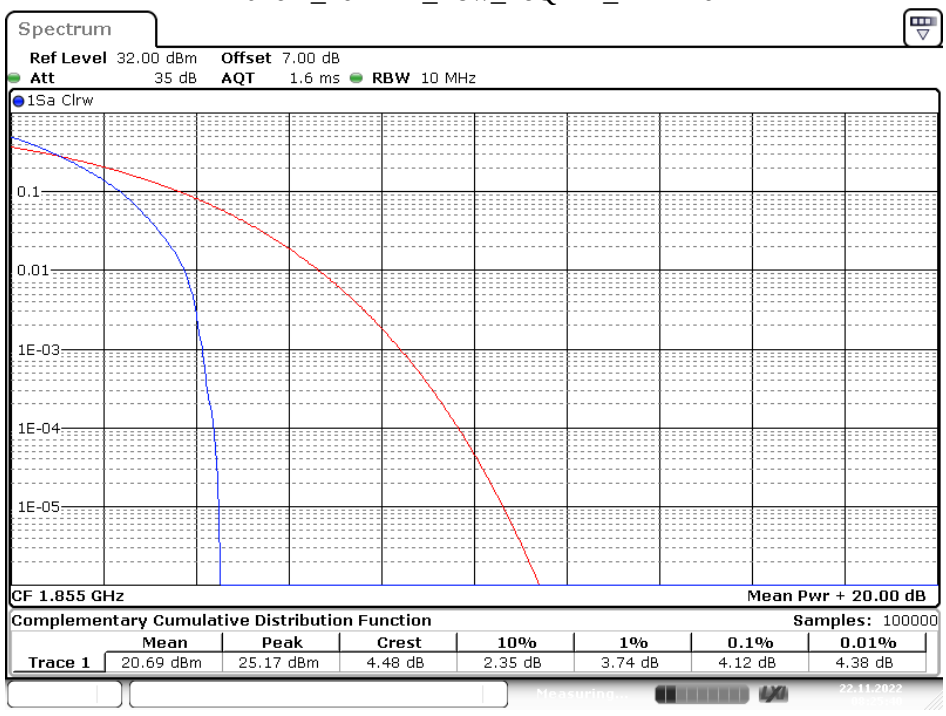
Date: 22.NOV.2022 08:21:21

Band 2_10 MHz_Low_16QAM_RB1#0



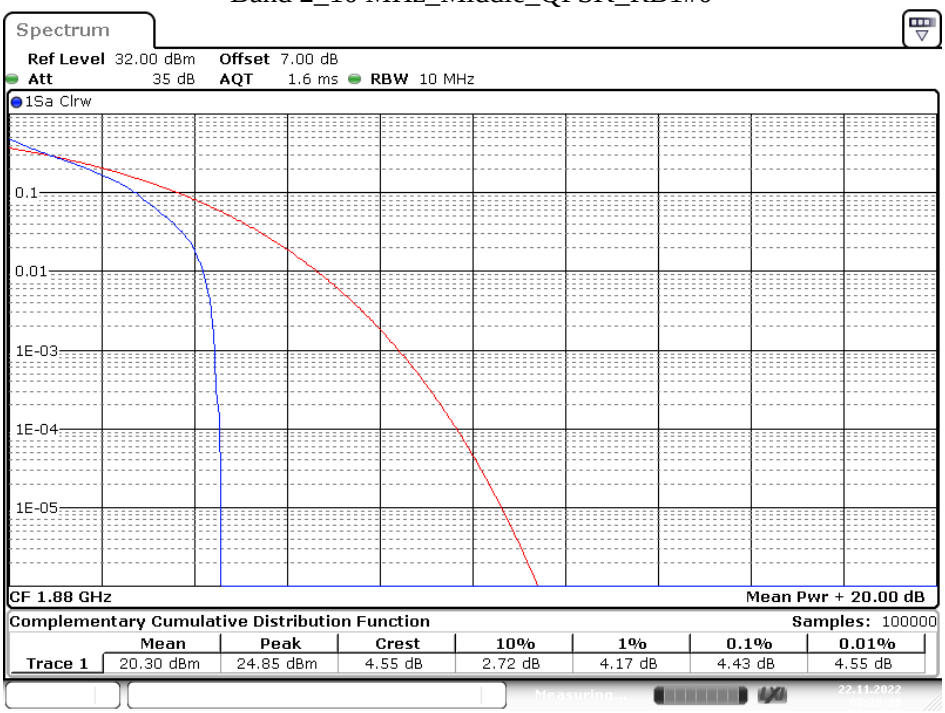
Date: 22.NOV.2022 08:25:06

Band 2_10 MHz_Low_16QAM_RB27#0



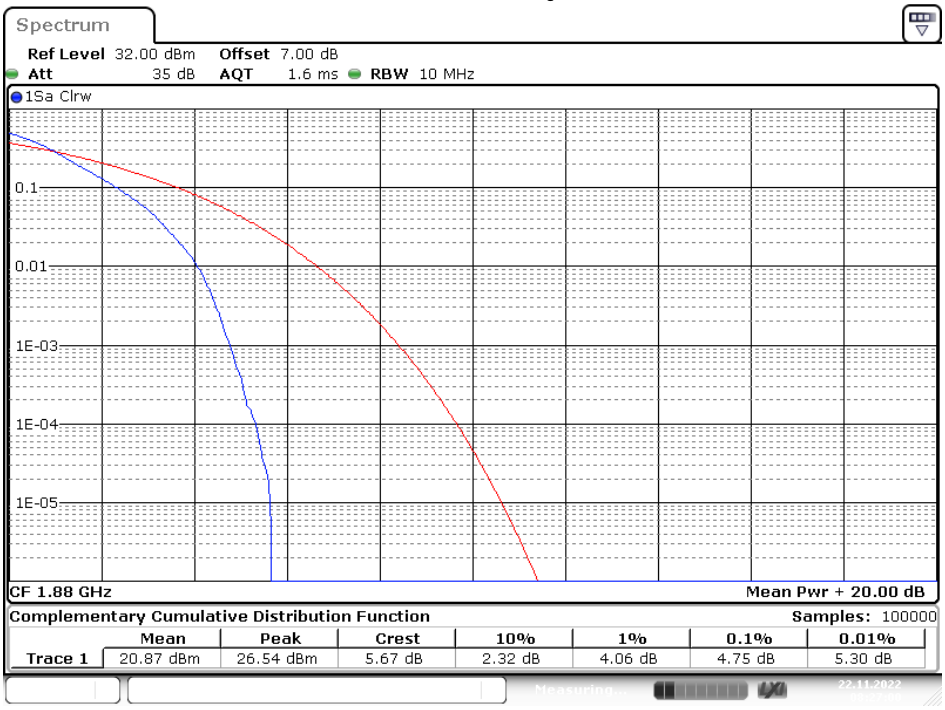
Date: 22.NOV.2022 08:25:40

Band 2_10 MHz_Middle_QPSK_RB1#0



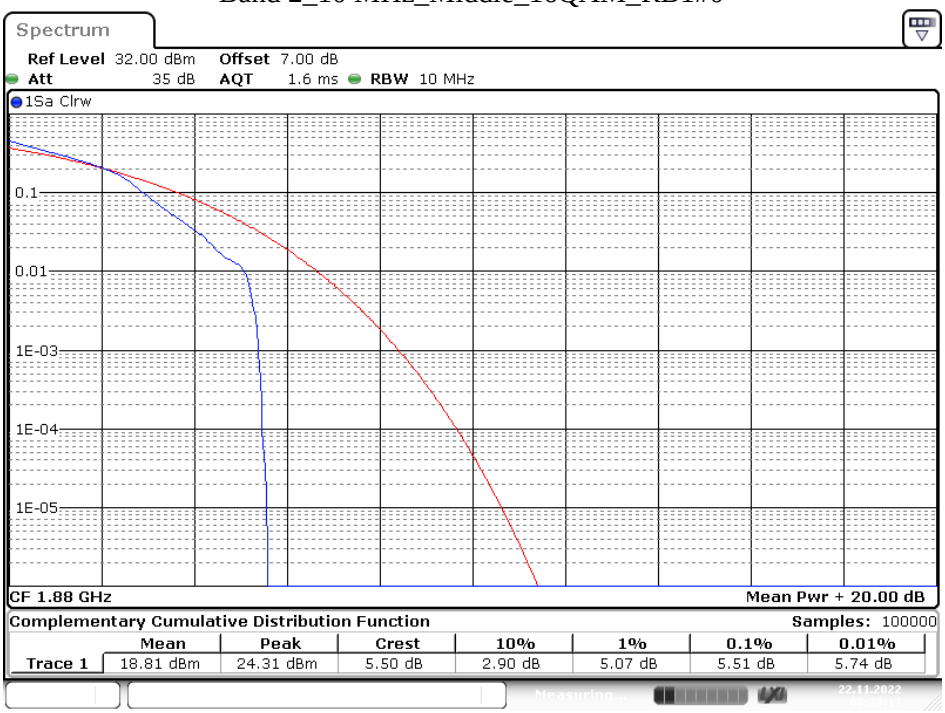
Date: 22.NOV.2022 08:26:20

Band 2_10 MHz_Middle_QPSK_RB50#0



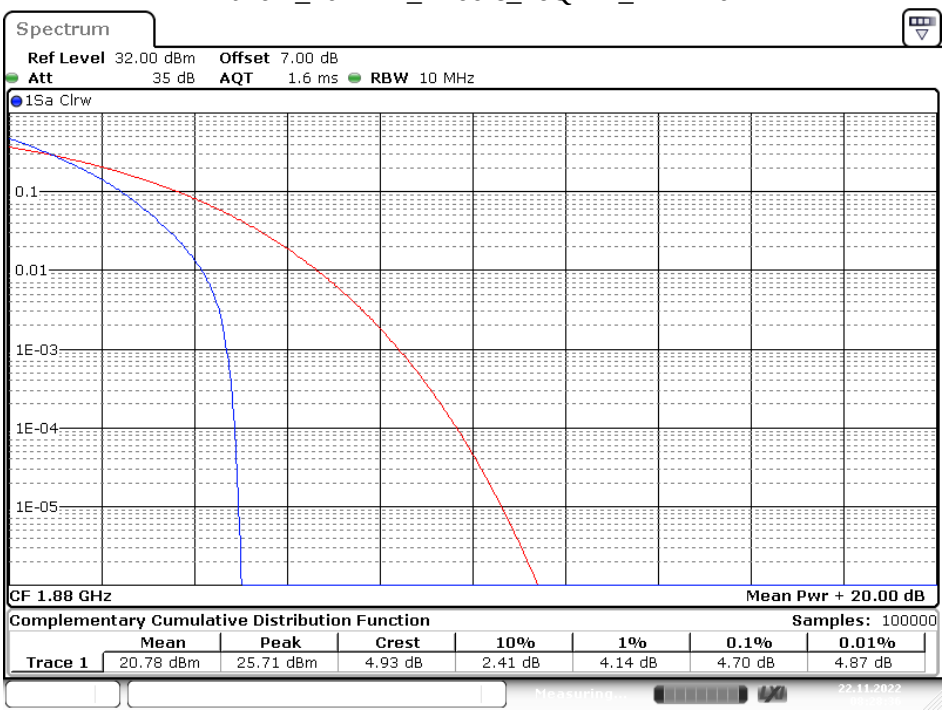
Date: 22.NOV.2022 08:27:00

Band 2_10 MHz_Middle_16QAM_RB1#0



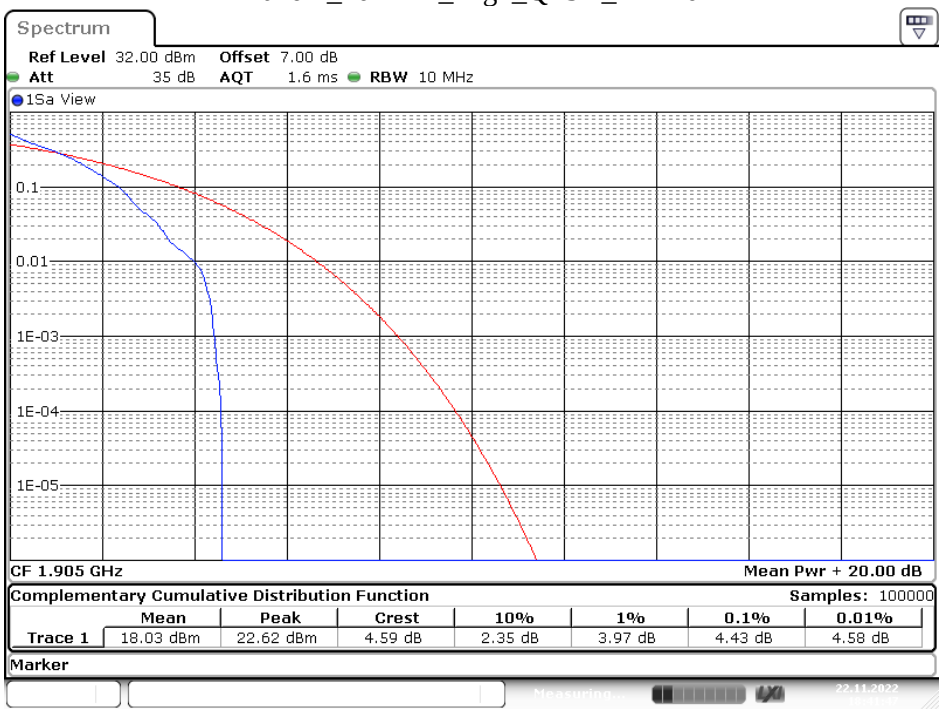
Date: 22.NOV.2022 08:28:13

Band 2_10 MHz_Middle_16QAM_RB27#0



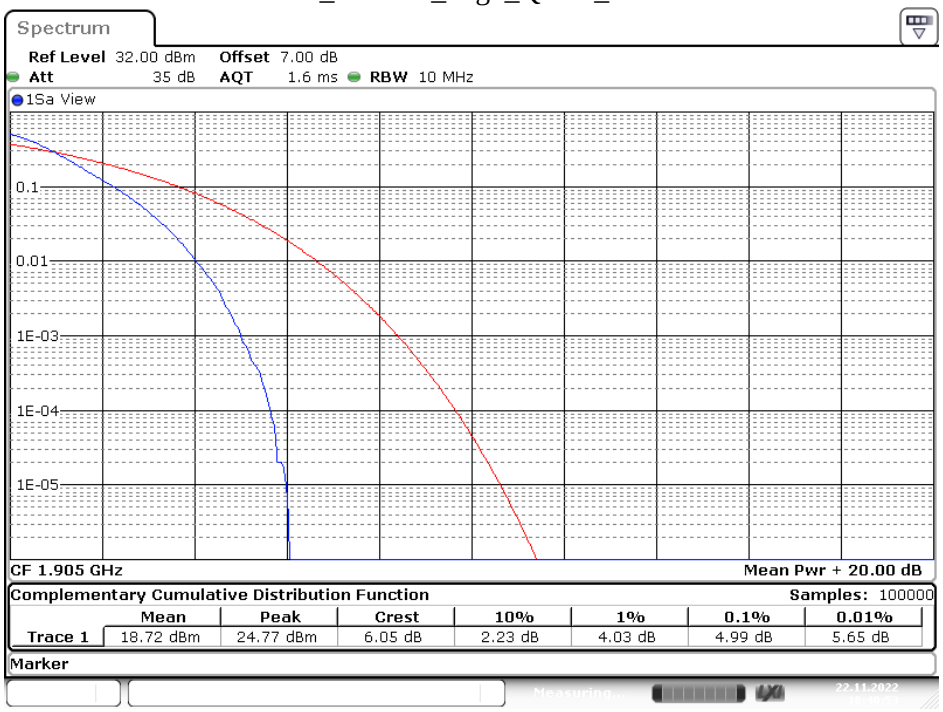
Date: 22.NOV.2022 08:28:36

Band 2_10 MHz_High_QPSK_RB1#0



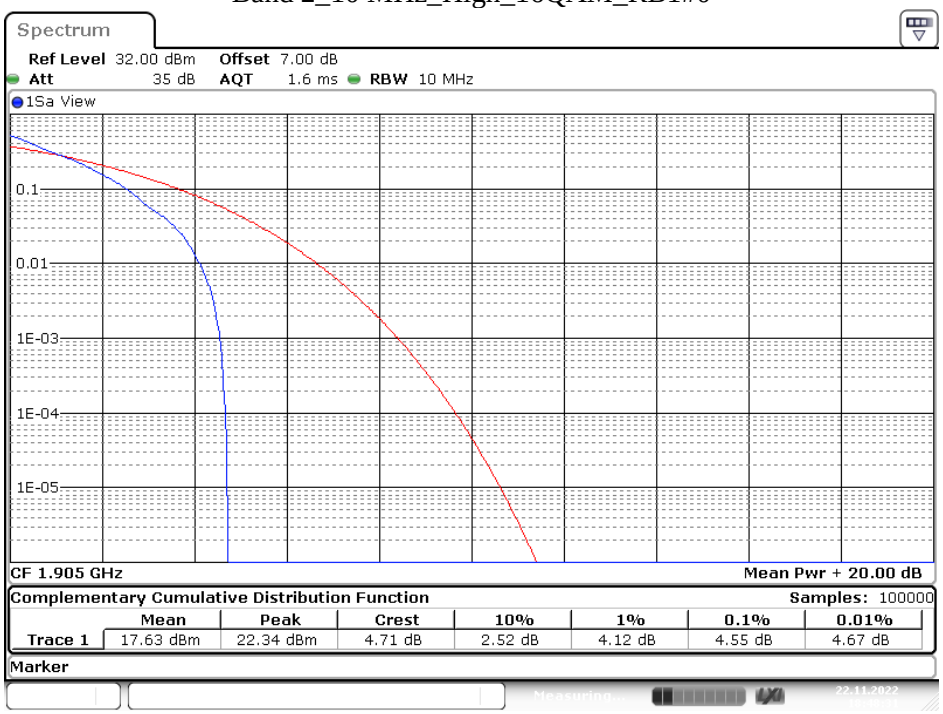
Date: 22.NOV.2022 18:41:47

Band 2_10 MHz_High_QPSK_RB50#0



Date: 22.NOV.2022 18:40:54

Band 2_10 MHz_High_16QAM_RB1#0



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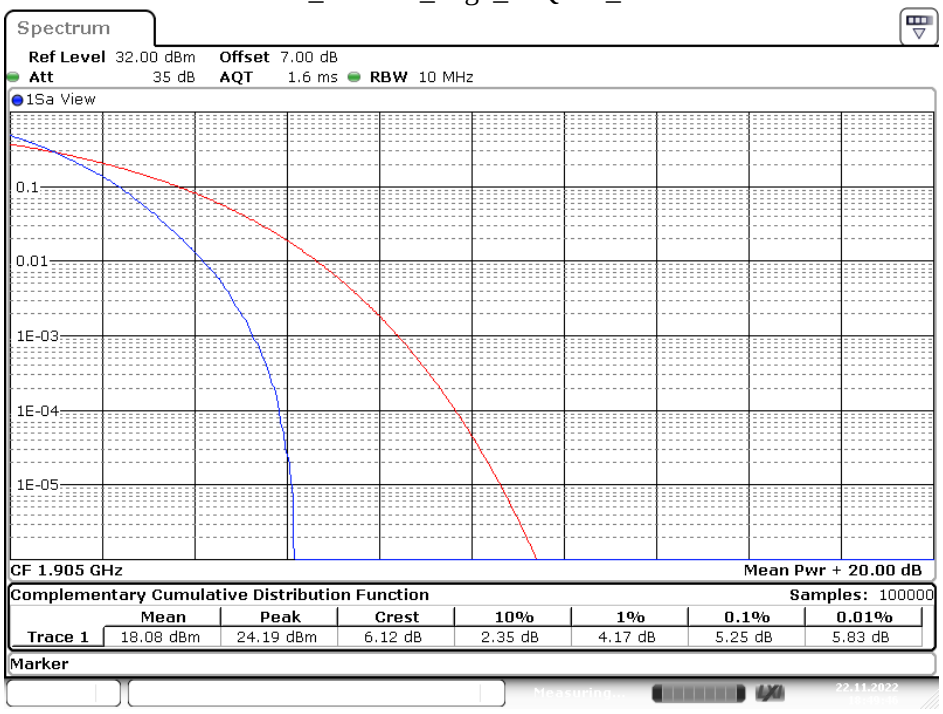
Band 2_10 MHz_High_16QAM_RB27#0



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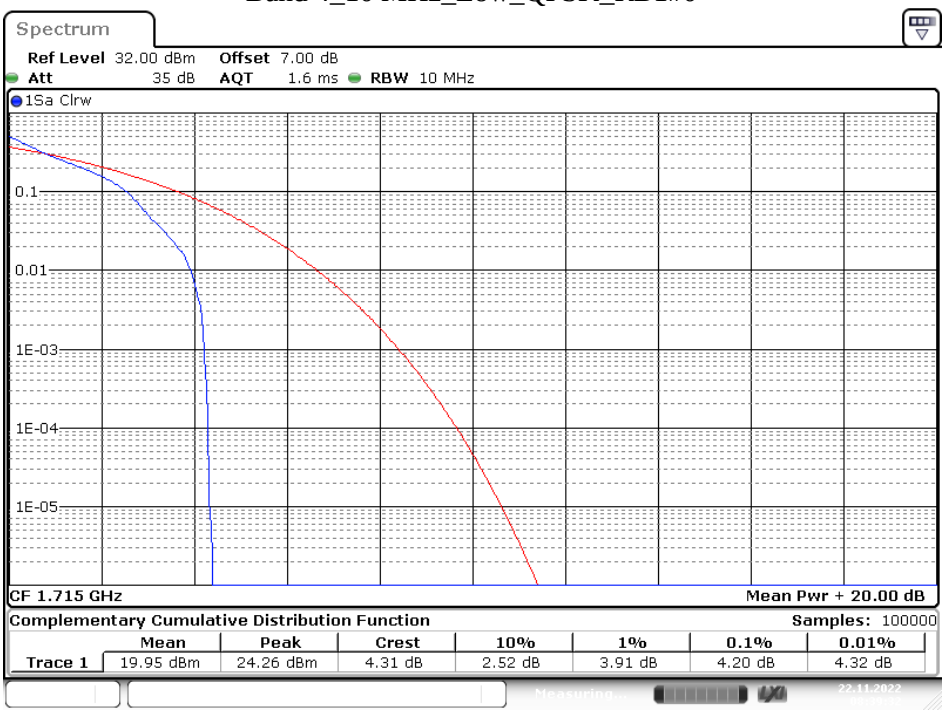
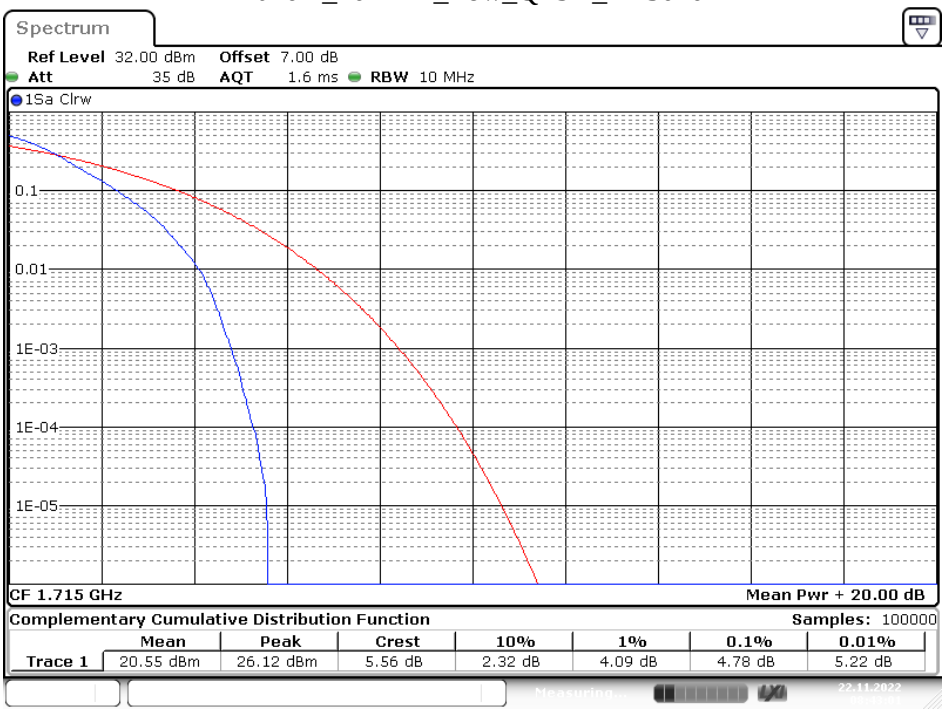
Band 4_10 MHz_Low_QPSK_RB1#0



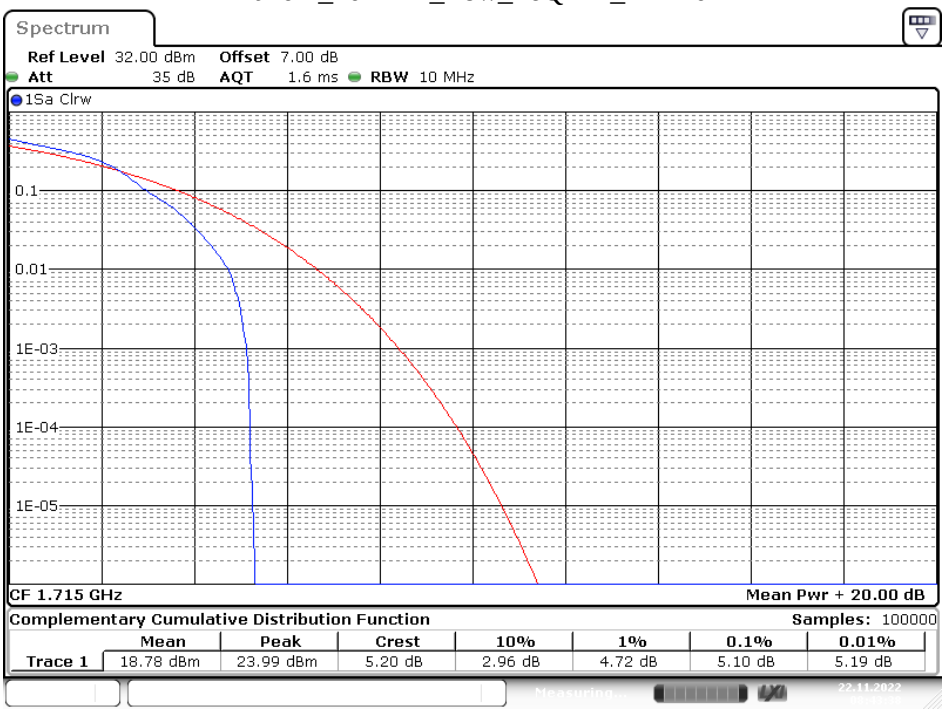
Date: 22.NOV.2022 08:39:32

Band 4_10 MHz_Low_QPSK_RB50#0



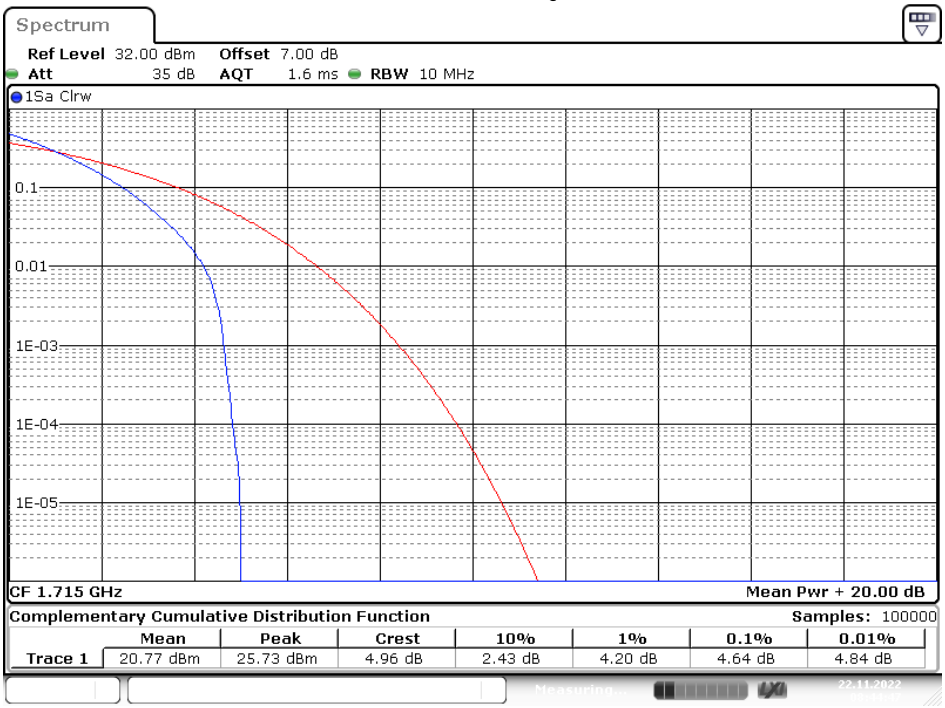
Date: 22.NOV.2022 08:43:01

Band 4_10 MHz_Low_16QAM_RB1#0



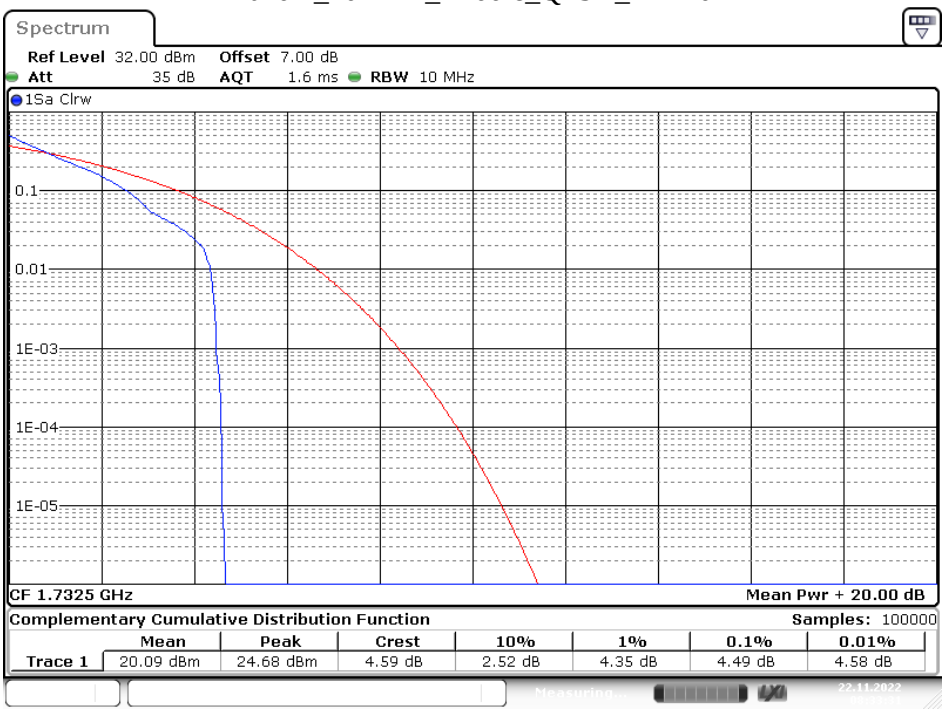
Date: 22.NOV.2022 08:43:38

Band 4_10 MHz_Low_16QAM_RB27#0



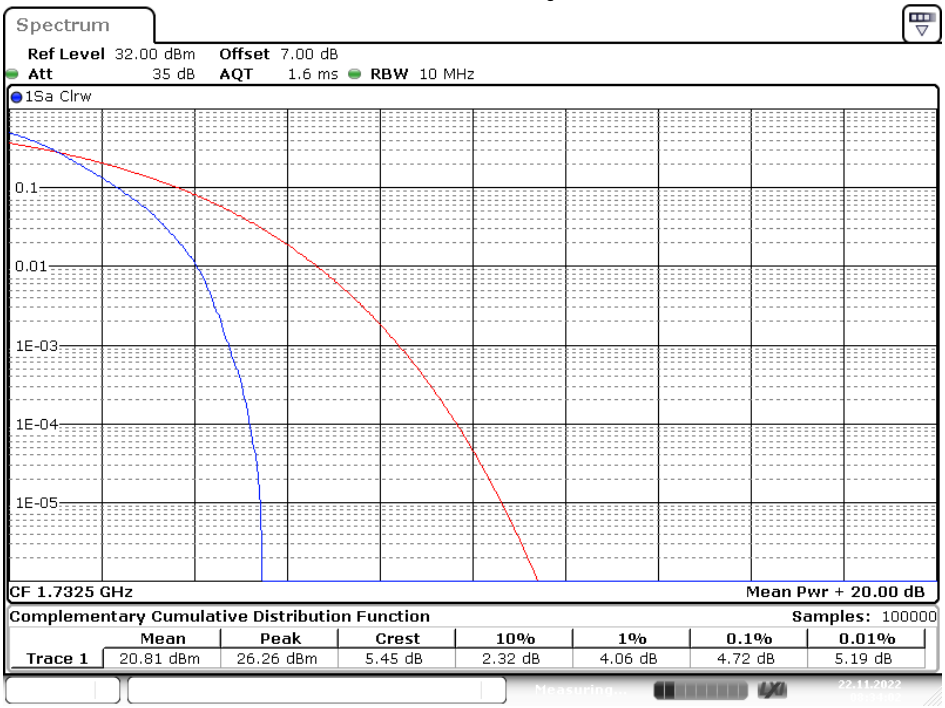
Date: 22.NOV.2022 08:44:47

Band 4_10 MHz_Middle_QPSK_RB1#0



Date: 22.NOV.2022 08:33:31

Band 4_10 MHz_Middle_QPSK_RB50#0



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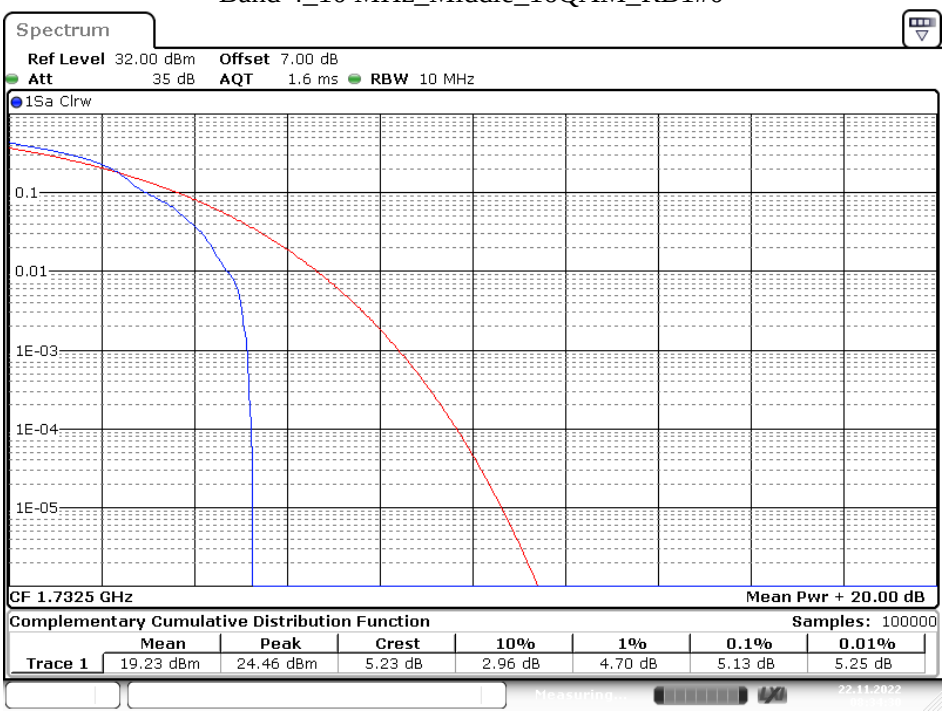
Band 4_10 MHz_Middle_16QAM_RB1#0



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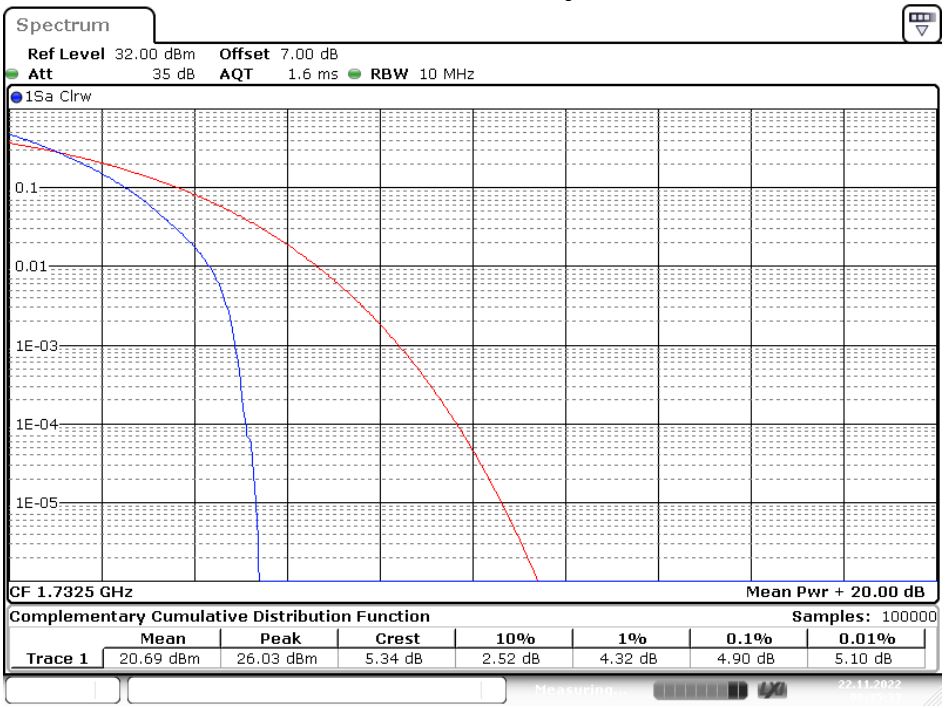
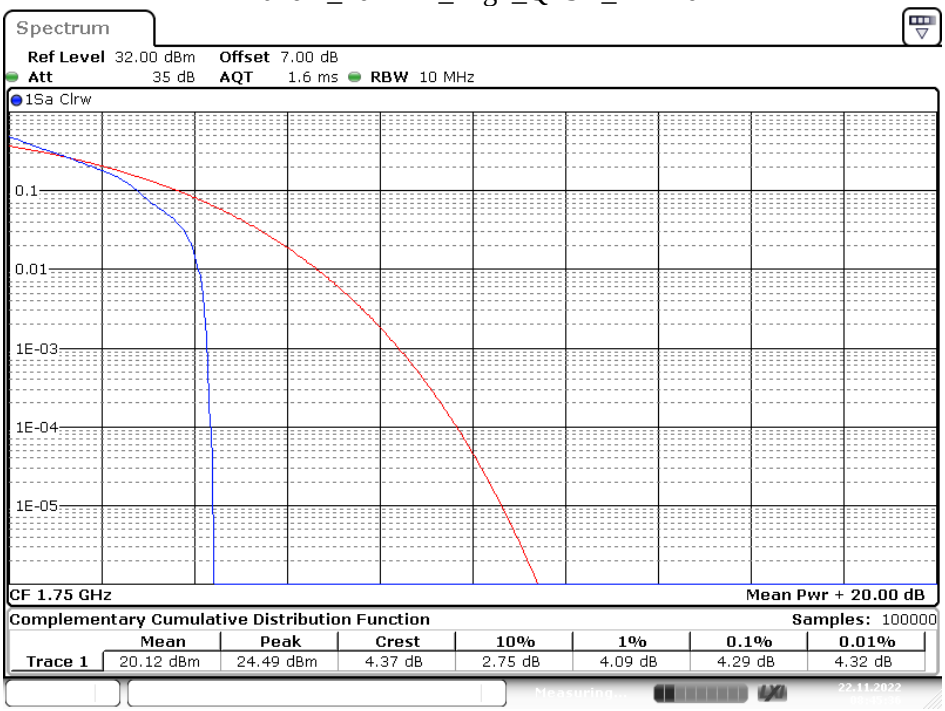
Band 4_10 MHz_Middle_16QAM_RB27#0



Date: 22.NOV.2022 08:35:33

Band 4_10 MHz_High_QPSK_RB1#0



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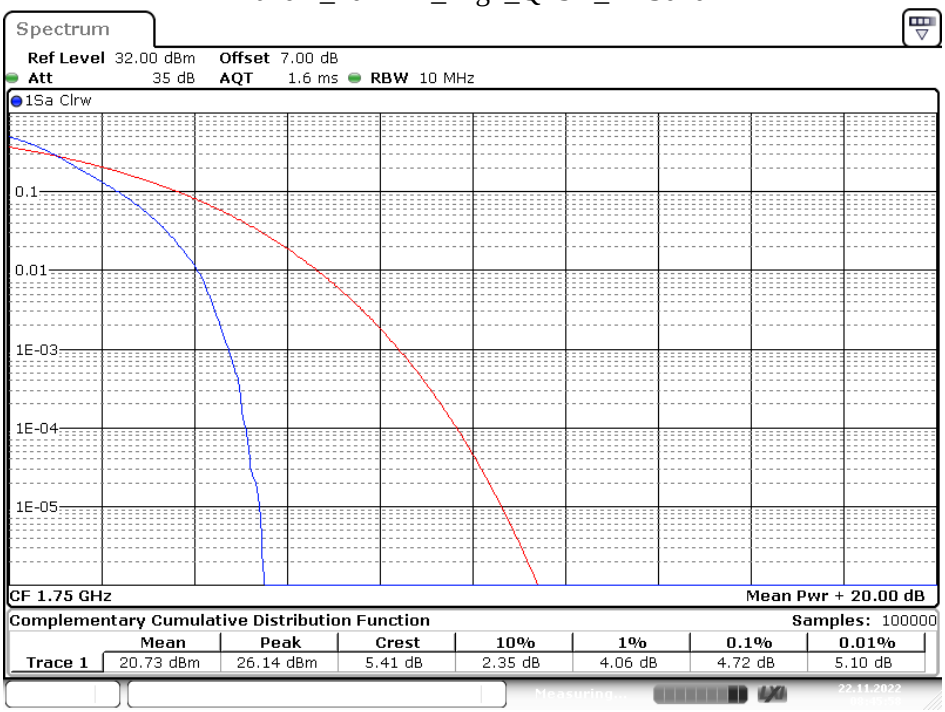
Band 4_10 MHz_High_QPSK_RB50#0



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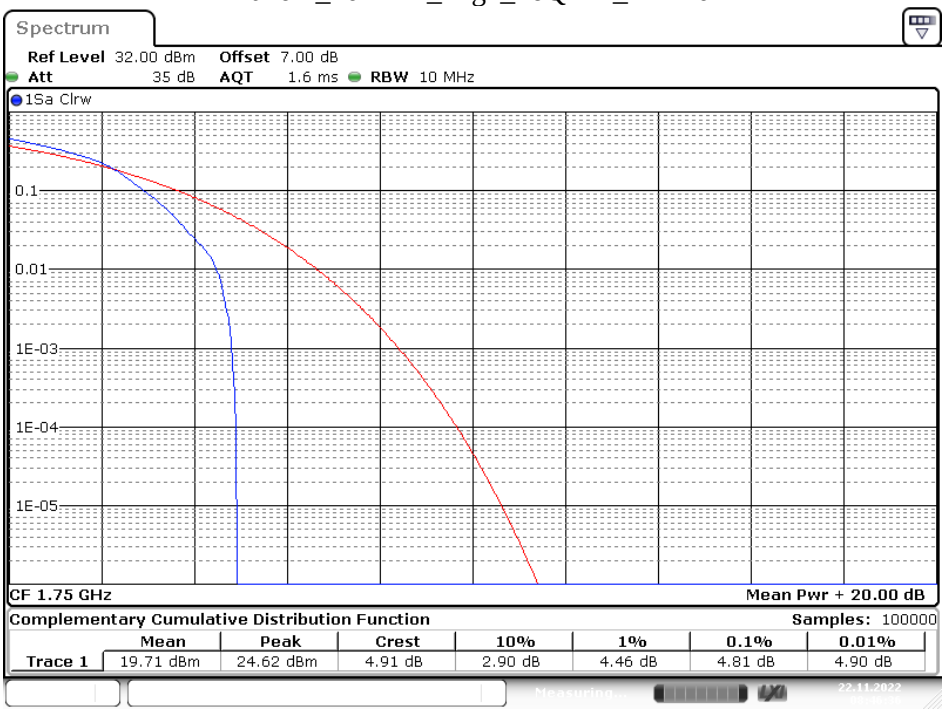
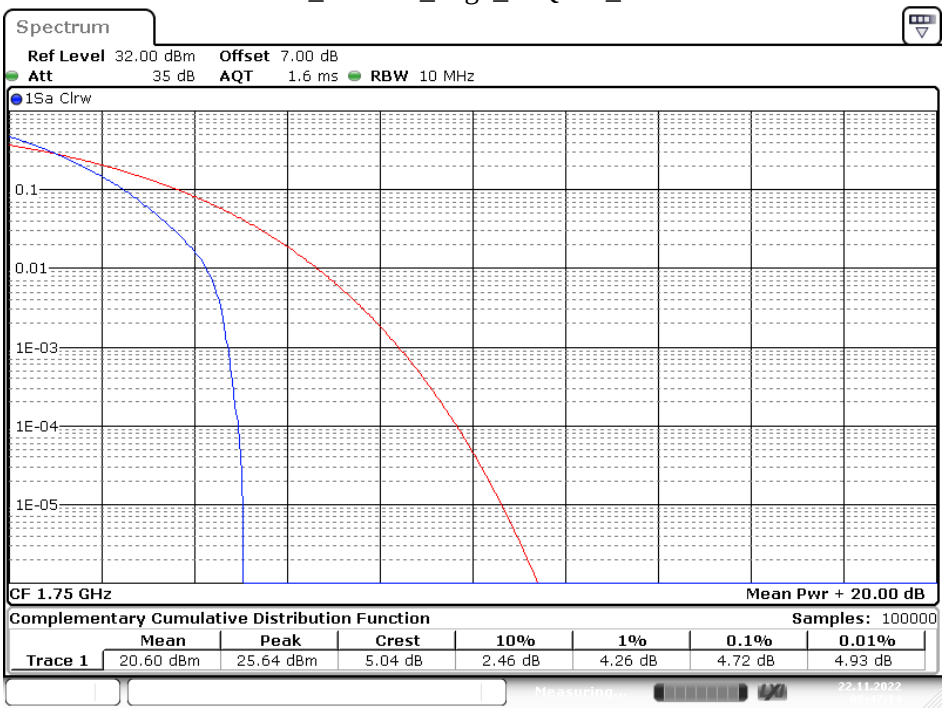
Band 4_10 MHz_High_16QAM_RB1#0



Date: 22.NOV.2022 08:46:35

Band 4_10 MHz_High_16QAM_RB27#0



Date: 22.NOV.2022 08:47:14

FCC §2.1049, §24.238 & §27.53 - OCCUPIED BANDWIDTH

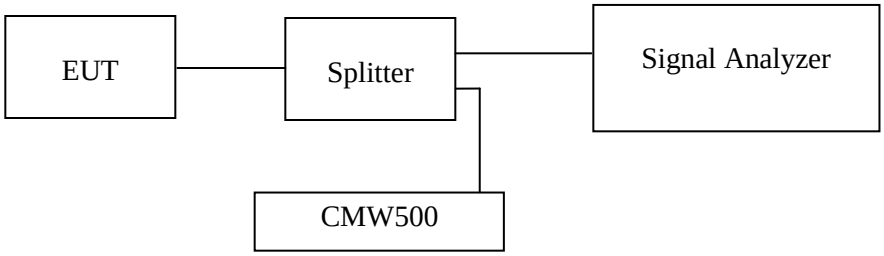
Applicable Standard

FCC 47 §2.1049, §24.238, and §27.53.

Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.



Note: the worst path loss (cable loss and splitter inset loss) among the test frequency range has included in the plot.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Jesse Chen on 2022-10-28.

EUT operation mode: Transmitting

Test Result: Pass

LTE Band 2:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.102	1.350	1.108	1.326	1.102	1.332
	16QAM	1.108	1.326	1.096	1.296	1.096	1.296
3 MHz	QPSK	2.695	2.964	2.695	2.952	2.695	2.952
	16QAM	2.683	2.964	2.695	2.976	2.683	2.964
5 MHz	QPSK	4.511	5.040	4.531	5.060	4.511	5.020
	16QAM	4.531	5.060	4.511	5.020	4.531	5.040
10 MHz	QPSK	8.942	9.720	8.942	9.840	8.942	9.720
	16QAM	4.551	5.360	4.551	5.360	4.551	5.400
15 MHz	QPSK	13.473	14.760	13.473	14.640	13.413	14.640
	16QAM	4.551	5.460	4.551	5.400	4.551	5.460
20 MHz	QPSK	17.964	19.600	17.884	19.280	17.884	19.200
	16QAM	4.631	5.440	4.551	5.520	4.551	5.360

LTE Band 4:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.102	1.302	1.102	1.332	1.108	1.338
	16QAM	1.102	1.314	1.096	1.302	1.096	1.296
3 MHz	QPSK	2.683	2.964	2.695	2.952	2.695	2.952
	16QAM	2.683	2.964	2.695	2.952	2.683	2.964
5 MHz	QPSK	4.511	5.020	4.531	5.040	4.511	5.040
	16QAM	4.531	5.060	4.511	5.000	4.531	5.060
10 MHz	QPSK	8.942	9.720	8.942	9.760	8.942	9.800
	16QAM	4.551	5.320	4.551	5.320	4.551	5.320
15 MHz	QPSK	13.473	14.700	13.413	14.700	13.413	14.700
	16QAM	4.551	5.340	4.551	5.400	4.551	5.400
20 MHz	QPSK	17.964	19.680	17.884	19.280	17.884	19.360
	16QAM	4.551	5.440	4.551	5.520	4.551	5.360

Test plots refer to the Appendix A.

FCC §2.1051, §24.238(a) & §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

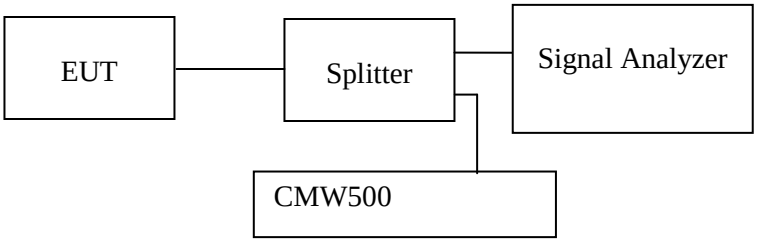
Applicable Standard

FCC §2.1051, §24.238(a) & §27.53.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Note: the worst path loss (cable loss and splitter inset loss) among the test frequency range has included in the plot.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56%
ATM Pressure:	101.0 kPa

The testing was performed by Jesse Chen on 2022-09-13.

EUT operation mode: Transmitting

Test result: Pass. Test plots refer to the Appendix B.

FCC § 2.1053; § 24.238 (a); §27.53 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, § 24.238(a) & § 27.53.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the receiving antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Test Data

Environmental Conditions

Temperature:	28 ℃
Relative Humidity:	57 %
ATM Pressure:	101.3 kPa

The testing was performed by Level Li on 2022-08-16.

EUT operation mode: Transmitting

Pre-scan all bandwidth and modulation, the worst case as below:

30MHz-20GHz:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	Reading (dBuV)	PK/Ave		Height (m)	Polar (H/V)				
BAND2, 1.4MHz bandwidth, QPSK, Low Channel									
39.45	-49.74	PK	208	1.9	H	6.49	-43.25	-13	-30.25
740.63	-51.53	PK	302	1.8	V	11.39	-40.14	-13	-27.14
3701.4	-31.30	PK	177	1.7	H	4.72	-26.58	-13	-13.58
3701.4	-28.86	PK	8	1.4	V	4.61	-24.25	-13	-11.25
BAND2, 1.4MHz bandwidth, QPSK, Middle Channel									
39.45	-47.76	PK	24	1.8	H	6.49	-41.27	-13	-28.27
740.63	-52.93	PK	307	2.1	V	11.39	-41.54	-13	-28.54
3760	-30.31	PK	221	2.2	H	4.94	-25.37	-13	-12.37
3760	-28.40	PK	284	1.1	V	4.85	-23.55	-13	-10.55
BAND2, 1.4MHz bandwidth, QPSK, High Channel									
39.45	-51.63	PK	18	2.1	H	6.49	-45.14	-13	-32.14
740.63	-51.05	PK	349	1.2	V	11.39	-39.66	-13	-26.66
3818.6	-32.92	PK	13	1.0	H	5.25	-27.67	-13	-14.67
3818.6	-29.67	PK	341	2.2	V	5.08	-24.59	-13	-11.59
BAND4, 1.4MHz bandwidth, QPSK, Low Channel									
39.45	-49.68	PK	55	2.0	H	6.49	-43.19	-13	-30.19
740.63	-49.97	PK	56	1.8	V	11.39	-38.58	-13	-25.58
3421.4	-31.97	PK	112	1.7	H	2.72	-29.25	-13	-16.25
3421.4	-31.26	PK	111	1.3	V	2.59	-28.67	-13	-15.67
BAND4, 1.4MHz bandwidth, QPSK, Middle Channel									
39.45	-50.60	PK	295	1.5	H	6.49	-44.11	-13	-31.11
740.63	-53.75	PK	202	1.4	V	11.39	-42.36	-13	-29.36
3465	-32.07	PK	208	1.5	H	3.09	-28.98	-13	-15.98
3465	-30.36	PK	331	1.7	V	2.97	-27.39	-13	-14.39
BAND4, 1.4MHz bandwidth, QPSK, High Channel									
39.45	-49.45	PK	35	1.7	H	6.49	-42.96	-13	-29.96
740.63	-49.96	PK	61	1.3	V	11.39	-38.57	-13	-25.57
3508.6	-31.95	PK	196	1.3	H	3.44	-28.51	-13	-15.51
3508.6	-30.33	PK	238	1.7	V	3.31	-27.02	-13	-14.02

Note:
Absolute Level = Reading Level + Substituted Factor
Substituted Factor contains: SG Level - Cable loss+ Antenna Gain
Margin = Absolute Level – Limit

FCC § 24.238 (a); §27.53 (h) - BAND EDGES

Applicable Standard

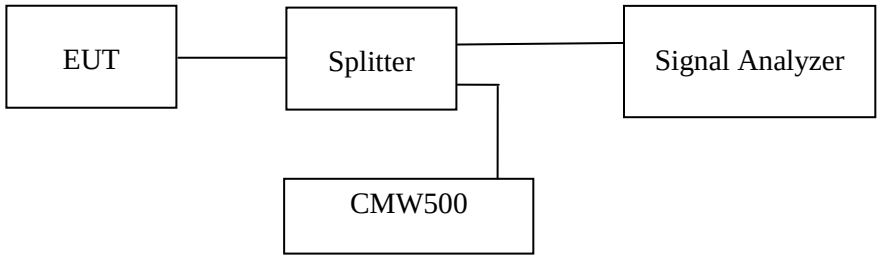
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to FCC §27.53 (h), 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.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency



Note: the worst path loss (cable loss and splitter inset loss) among the test frequency range has included in the plot.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Jesse Chen from 2022-09-13 to 2022-10-18.

EUT operation mode: Transmitting

Test Result: Pass. Test plots refer to the Appendix C.

FCC § 2.1055; § 24.235; §27.54 - FREQUENCY STABILITY

Applicable Standard

FCC § 2.1055, §24.235 & §27.54.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

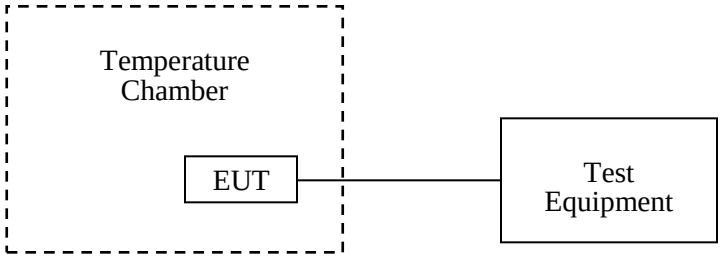
According to §24.235 & §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The RF output of EUT was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Jesse Chen on 2022-09-13.

EUT operation mode: Transmitting

Test Result: Pass. Please refer to the following tables.

LTE: 20MHz Bandwidth was the worst cast and recorded.

QPSK:

Band 2:

Temperature (℃)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	4.5	1850.0102	1909.9799	1850	1910
-20		1850.0103	1909.9804	1850	1910
-10		1850.0106	1909.9795	1850	1910
0		1850.0096	1909.9806	1850	1910
10		1850.0105	1909.9807	1850	1910
20		1850.0103	1909.9804	1850	1910
30		1850.0109	1909.9805	1850	1910
40		1850.0095	1909.9792	1850	1910
50		1850.0099	1909.9797	1850	1910
20	3.8	1850.0100	1909.9798	1850	1910

Band 4:

Temperature (℃)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	4.5	1710.0011	1754.9817	1710	1755
-20		1710.0057	1754.9792	1710	1755
-10		1710.0007	1754.9838	1710	1755
0		1710.0021	1754.9804	1710	1755
10		1710.0025	1754.9817	1710	1755
20		1710.0027	1754.9811	1710	1755
30		1710.0012	1754.9803	1710	1755
40		1710.0007	1754.9846	1710	1755
50		1710.0060	1754.9867	1710	1755
20	3.8	1710.0098	1754.9820	1710	1755

16QAM:

Band 2:

Temperature (℃)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	4.5	1850.0102	1909.9798	1850	1910
-20		1850.0103	1909.9799	1850	1910
-10		1850.0095	1909.9803	1850	1910
0		1850.0099	1909.9806	1850	1910
10		1850.0102	1909.9800	1850	1910
20		1850.0101	1909.9802	1850	1910
30		1850.0093	1909.9794	1850	1910
40		1850.0101	1909.9799	1850	1910
50		1850.0097	1909.9800	1850	1910
20	3.8	1850.0100	1909.9802	1850	1910

Band 4:

Temperature (℃)	Power Supplied (V_{DC})	F_L (MHz)	F_H (MHz)	F_L Limit (MHz)	F_H Limit (MHz)
-30	4.5	1710.0150	1754.9924	1710	1755
-20		1710.0188	1754.9914	1710	1755
-10		1710.0144	1754.9942	1710	1755
0		1710.0177	1754.9946	1710	1755
10		1710.0147	1754.9904	1710	1755
20		1710.0195	1754.9941	1710	1755
30		1710.0152	1754.9895	1710	1755
40		1710.0126	1754.9897	1710	1755
50		1710.0147	1754.9897	1710	1755
20	3.8	1710.0160	1754.9931	1710	1755

Note: the extreme voltage was provided by the manufacturer.

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